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[OFFICIAL NOTICE.]

Detroit Meeting, American Gas Institute.

HEADQUARTERS, AMERICAN GAS INSTITUTE,
25 West 39th street, New York, Sept. 23d, 1909.

The following preliminary outline of the plans underway for the Detroit meeting of the American Gas Institute may be of interest. The Committee of Arrangements, as appointed by President Prichard, was made up as follows: Irvin Butterworth, Chairman; J. T. Lynn, J. J. Knight, B. O. Tippy, W. T. Barbour, W. S. Blauvelt.

With the approval of the President, Mr. Butterworth has added to the list a number of men prominent in the gas industry. The Sub-Committees are now arranged as follows:

Ways and Means Committee.—James T. Lynn, Chairman; W. T. Barbour, Geo. H. Barbour, James W. Dwyer, John J. Knight, Frank Hulswit, Lazard Kahn, D. J. Collins, J. N. Williamson.

Smoker.—Jules G. Hoffman, Chairman; Alonzo P. Ewing, A. L. Zwisler, F. P. Mueller, Ed. Leaky.

Boat Trip.—V. F. Dewey, Chairman; W. S. Blauvelt, Jas. Foley, Roy Shacklette.

Entertainment of Ladies.—H. L. Olds, Chairman; W. G. Henry, W. R. Vanvalkenburg, Andrew H. Green, Jr., Samuel T. Douglas, W. E. Moss, B. O. Tippy, Stanhope Boal, W. C. Kennedy, George D. Roper, George M. Clark, Charles H. Dickey, A. T. Knowlson.

Hotels, Hall and Information.—E. F. Lloyd, Chairman; George Osius, Edward M. Mabcourt, G. O. Ciliax.

The Committee has decided to arrange for an informal "Smoker" at the Wayne Pavilion, instead of a banquet. There will be a theater party, luncheon at the Country Club and trips about the city for the ladies. A steamboat trip to Lake St. Clair, down the river to Bois Blanc, including an inspection of the very interesting engineering work at the new channel, and a visit to the Solvay Process plant, will be features. The headquarters will be at the Pontchartrain, and the meetings will be held at Elks' Hall, only a block distant.

Mr. R. B. Brown, Chairman of the Technical Committee, advises that about 16 papers are being prepared, and that Dr. Hyde has consented to give a lecture on "Illuminating Engineering."

There will be three good papers on commercial subjects, one on "Accounting," one on "Illuminating Engineering in Practical Applications," and a first-class technical and general programme.

The reports from the "Wrinkle Department," "Bureau of Information," and the various committees, will contain matter of unusual interest.

HOTEL ACCOMMODATIONS.

The following hotel information is presented for your consideration:

Hotel Pontchartrain - European Plan.—Rooms with hot and cold running water, 1 person in room, $2 to $2.50 per day. Room with hot and cold running water, 2 persons in room, $3 to $4 per day; room with bath, 1 person in room, $3, $3.50, $4, $5 per day; 2 persons, $5, $6, $7, $8 per day. This hotel will take care of about 250 people comfortably. They advise, however, that they have not very many single rooms, and it will be advisable for people desiring reservations to make them as quickly as possible. This hotel will be headquarters, and will be remembered by previous visitors to Detroit as on the site of the old Russell House. It is within sight of and about 2 minutes' walk from the Convention Hall. It is reached from all depots by any car at the depot without change.

Hotel Cadillac—European and American Plan.—Rooms without bath on the American plan $3.50 and $4 per day, each person; rooms with bath, $4, $5, $6, $7, $8 per day, each person. Rooms without bath, on the European plan, $2 to $2.50 per day, each person. Rooms with bath, $3, $3.50, $4, $5, $6 per day each person. They can accommodate 100 to 150 people. This hotel is located at the corner of Michigan avenue and Washington boulevard, and is 5 minutes' walk from the meeting hall, with a direct car line thereto. It is reached by car line from all depots, transferring at the City Hall to Michigan car. Transfer point is 3 blocks from hotel.

Wayne Hotel.—American Plan.—Without bath, $2.50 to $4 per day; with bath, $4.50 per day.

European Plan.—Room without bath, $1.50 to $2 per day; with bath, $2.50 to $3 per day. Two persons in one room, without bath, $2.50 to $3 per day; with bath, $4 to $4.50 per day.

This hotel will be able to accomodate about 50 people, and is located across from the Michigan Central depot and overlooking the river. It is 7 minutes by direct car line to the meeting hall and about 15 or 20 minutes' walk. The "Smoker" for Thursday evening will be held in the pavillion annex of this hotel.

Hotel Tuller.—European Plan.—Every room with bath, 1 person in a room, $2 to $4; 2 persons in a room, $3 to $5. They can accommodate about 100 people. The hotel is located at the corner of Adams and Park, which is one block off Woodward, facing Grand Circus Park, and is about 5 minutes walk from the meeting hall. It is reached by Woodward car line from Michigan Central depot. From Lake Shore, Grand Trunk and Union depots by any car with transfer to Woodward.

Hotel Ste. Claire.—American Plan.—With bath for one, $3.50 and $4; two, $7 and $8. Without bath for one, $2.50 and $3; two, $5 and $6. This hotel will accommodate 50 or 60 people nicely. It is located at the head of Monroe avenue, in sight of and two minutes walk from the meeting hall. It is reached by all car lines from depots, transferring to Michigan car at City Hall. Transfer point is 3 blocks from hotel. Cars from Lake Shore depot pass hotel.

Griswold House.—European Plan.—Rooms, with running hot and cold water, $1 per day; rooms, with bath, $1.50 and $2 per day. Where more than one person occupies the same room, the rate for each additional person is $1 per day. The hotel is located at the corner of Grand River avenue and Griswold street, about 5 minutes walk from meeting hall. Is reached by Woodward cars from Michigan Central depot within one short block. Is reached from Union, Lake Shore and Grand Trunk depots by transfer to Jefferson cars, which pass the door.

Hotel Normandie.—European and American Plan.—European plan: $1, $1.50, $2 per day, without bath; $2, $2.50 per day, with bath.

LIBRARY OF CONGRESS, SEP 27 1909, SMITHSONIAN DEPOSIT.

Where two or more occupy the same room, a reduction of 50 cents is made, except with the minimum rate. This hotel is located on Congress street, ½ block east of Woodward, and in the same block as the Pontchartrain. Five minutes walk from meeting hall, and is reached direct by car line from all depots.

Hotel Metropole.—European Plan.[1]—Rooms, without bath, $1; with bath, $1.50. This hotel is located on Woodward avenue, alongside the Pontchartrain.

Oriental Hotel.—European Plan.[2]—$1 to $2 per day, *with free use* of the plunge and shower baths. This hotel also has Turkish and Russian bath house annex, and is located on Farrar street near Gratiot avenue, about 3 minutes' walk from the meeting hall. Is reached within 2 blocks by direct car line from any depot.

In going over the matter with the hotel people they urge that everyone who is going to attend the convention, write and engage their accommodations, and that this be done with very little delay. They should state exactly the date and hour when they expect to arrive, if not in the first communication reserving the room, at least in a subsequent communication to the hotel in order that the accommodations may be ready for them on arrival.

Detroit is particularly a Convention City, and a clearing point for tourists to all points north, as well as a gateway for tourists and commercial travel east and west, hence in the middle of October, if accommodations are not properly reserved, it may be difficult to get anything suitable or satisfactory. A. B. Beadle, Secretary.

BRIEFLY TOLD.

The Eighteenth Meeting of the Michigan Gas Association.—That Chief Lynn and his associates are men of original action was amply proved anew by those who, the morning of the 14th inst., found themselves aboard the good steamer "City of St. Ignace," bound for Mackinac. The weather was of the finest sort, albeit a trifle warm at the start, but the unremitting attentions of the committeemen headed by President Lynn, Secretary Ewing, Glenn R. Chamberlain, Irvin Butterworth, Purser Collins and a long list of others "also on deck," caused comfort to all. When the lines were cast off a count of noses showed that 196 had determined to assist at the Michigan's 18th, and a more fraternal lot 'twas not our part to have seen. Steaming up the Detroit river and into Lake St. Clair, on through the latter to the depths of beautiful Lake Huron, the trip was a continuous revealing of magnitude, of glory and beauty. After luncheon, which was served shortly after noon, the members assembled in the steamer's handsome and useful main saloon to attend the first session of the meeting. This was called to order by President Lynn at 2:30 P.M. of the 14th. Routine business of the initiative type was rapidly taken care of, and the first technical order—that of reading the President's address—was reached. The President asked that the address be taken as read, which request was so unusual that many were at a loss to know why this course was advocated and followed. The real reason was that Mr. Lynn could not bring himself to repeat with equanimity the sentences which referred to the passing away of "Fred." R. Persons, whose yeoman's work in connection with the earlier history of the Michigan Association was well remembered by all. The reports of the Executive Committee and of the Secretary and Treasurer having been disposed of, the President introduced Mr. Glenn R. Chamberlain, of Grand Rapids, whose excellent narration of "How We Disposed of Our Surplus Coke," lead to a lengthy discussion. The next number was the paper by Mr. John H. Wyman, whose theme was the "Efficiency of Domestic Fuels," in which the author brought out some matter that will cause further study of that interesting question. The third number was well illustrative of the valuable work that is being accomplished under the Association's fellowships' studies at the Ann Arbor University. This paper which was entitled, "Studies in Manufacturing Coal Gas," bore every mark of earnest, well conducted study. The paper was read by Mr. W. A. Dunkly, and it was the result of collaboration of work by Prof. A. H. White—by the-way, the Professor was with us, and made the trip without turning a hair—Jas. H. Wyman, W. A. Dunkly and Perry A. Barker. Surely, the scholarship is accomplishing things of merit and worth. The discussion on this paper, which discussion naturally was limited, was followed by the appointment of several special committees, and then adjournment. After dinner the members listened to a somewhat prosaic lecture on "The Conservation of Fuels," by Mr. J. C. Roberts, Assistant Chief Engineer in charge of the U. S. Geological Survey, the recital of which brought clearly to mind the largeness and importance of the work that is going on along these lines under the control of the government authorities. The lecture was plentifully and intelligently illuminated by means of lantern slides. Other things transpired during the evening, not the least provoking being a tumult that "largely resembled" a thunderstorm on the Lakes. The "Soo" river was reached early the morning of the 15th, the entrance being made at Detour, and 'tis the truth that there thin overcoats and the like were actually needed for comfort. A brisk north by west wind was in evidence, and the dull gray scudding clouds occasionally spurted raindrops that stung, "if they hit you fair." Along in the day, however, the monarch of all the skies asserted himself and the glorious shore lines were again revealing themselves in all the beauty of an early autumnal haze. At 10 A.M., tied fast to the "Soo" dock, American side of the river, the technical inning was recommenced. Routine work taken up included the proposal to change the meeting time from September to May. This was voted down, but a reverse fate was in store for the proposition to make a slight increase in the salary attaching to the office of Secretary. The paper list was now reverted to and the members listened to an excellent paper on the "Heat Conductivity of Firebrick," by Mr. V. F. Dewey, of Detroit, the paragraphs of which bore good evidence of the thought put into the subject by the author. He is, by-the-way, one of the successful class gas men of the Association's bringing out. After luncheon the party travelled by small boat through the locks of the Canadian Soo, thence to the large steel plant on the Canadian side where the huge Lake Superior Corporation's way of producing steel rails was inspected from beginning to end. On the return a good dinner fitted many of the party for the task of "visiting the Soo by moonlight;" that is, it should have been moonlight. Thursday was a little "to the bad" from a weather point of view, but the voyage through the Soo river *en route* for Mackinac was but little delayed, and the run was perfect. At 10:30 A.M. a technical session was held. The introductory number was the paper by Mr. A. S. B. Little, of St. Louis, on "Retort Benches." It was really an interesting pronouncement or recounting, and the author is to be complimented on the tact displayed by him in keeping his story free of anything of an advertising nature whatever. The paper list was closed by a straight business-like document from Mr. Norman Macbeth, of the Welsbach Company, Gloucester, N. J., on the subject of "Illuminating Engineering Problems with Gas." It is quite refreshing to discover an illuminating engineer willing to concede very much of credit to the manufacturing and distributing engineer; but Mr. Macbeth found no difficulty in so doing. His paper is surely a valuable contribution that will be of good service to every branch of the business. At 2 o'clock a good luncheon amply fortified the members for the descent upon Mackinac Island, which was reached at 3 P.M. A slight rain failed to dampen the ardor of the explorers, and we venture to say the Mackinacites were never before treated to a sight like that which they witnessed Thursday week. The principal feature of the affair was the march through (and into) the principal thoroughfare. The dusky band of the good ship "St. Ignace" led the way, and we imagine that some of these thought their time for going into the subway was at hand. It would be impossible simply to do justice to the dignity displayed by President Lynn during the free-for all ride which he so nobly headed. Mr. Roper, too, lost a glove; which is important in his case. He may have been looking for it that caused him to have the boat return to the dock. However, "General Popler" likely can explain it all. After dinner the real thing of the trip was served up. Under the direct supervision of that mine of activity, in the shape of "Nat." J. Leaky, of the Michigan Ammonia Works, assisted and abetted by Glenn R. Chamberlain, L. B. Young, W. C. Steinwedell, Ewen Davis, Salesman Newberry, a most interesting vaudeville show was successfully pulled off. There were seven or eight numbers on the programme, and it is likely that the greatest success was the cake walk, in which the only Steinwedell and Mr. L. C. Bigelow participated. It was simply great, as may well be imagined when it is said that the heartiest applauders were the Ethiopians of the band. Another fine number was that rendered by Mr. Thatcher, of the Humphrey Company, whose sleight-of-hand work would do credit to a professional. The night of Thursday gave us some token of how rough these smooth waters may become, but the seafarers stood it like majors, save in one or two instances, in which old Neptune put it over youths. Friday morning surely was the finest possible in the shape of weather conditions. The route was from Lake Huron through the St. Claire river, passing those world-renowned resting spots known as "The Flats," "Faun Island," "Stag Island," and into St. Claire Lake on the homeward by 11 A.M. At this point the final session of the meeting was held. The election of officers resulted in these choices: President, B. O. Tippey; Vice-President, A. P. Ewing; Secretary and Treasurer, Glenn R. Chamberlain. The next place for meeting was put in the custody of the Executive Committee, with general orders to have another boat trip or to bring it off in Bay City. The tying-up at Detroit dock was made at 12 P.M. Mr. Ewing declined a re-election to the dual position of Secretary and Treasurer, and later on in Detroit he was presented with a beautiful silver service that will serve in adorning his sideboard and gracing his table, none the less remembering the happy thought that occurred to big, brave and bonnie "Jim" T. Lynn to have his meeting brought off in an original manner—a manner so successfully tried that it will have many successors in similar way.

1. Strictly "stag." 2. Strictly "stag."

CURRENT MENTION.—

Mr. Samuel M. Vance, Superintendent of the Bristol (Tenn.) Belt Line Railway Company, since 1894, has been advanced to the position of General Manager of the Bristol Gas and Electric Company.

Mr. William D. Ray has been appointed General Manager of the properties controlled by the Northern Indiana Gas and Electric Company.

Mr. Robert Seitz has resigned the position of Manager to the Hillsdale (Mich.) Gas Light Company.

Mr. Hugh Mitchell, Manager of the Joliet (Ills.) division of the Western United Gas and Electric Company, will not be lonesome this winter; that is, not so lonesome as heretofore. At least it is fair to so assume in that he succeeded some time ago in inducing sprightly Miss Mary Helen Talbot to accept his name and home. The ceremony was held in St. Patrick's Church, Joliet, the 9th inst., Rev. Dean Dunn officiating.

Retort Benches.

[A paper prepared by Mr. A. S. B. Little, of St. Louis, Mo., for the Lakes' Meeting of the Michigan Gas Association.]

Introduction.—Can any of you name a subject which appeals more to gas engineers of the present day than the one of retort benches? Since gas was first experimented with, in 1727, by Clayton and Hales in Cork, Ireland, through the period of 1776, when Prof. Bickel lighted his laboratory in Würtzburg, Germany, with gas obtained from the destructive distillation of bones, the retort and other forms of coal carbonizers have been of the order of skeleton at the feast! Murdoch, in 1792, began to try all kinds of material for his benches and adopted all sorts of angles in setting his retorts, failing in his attempts to introduce a number of those labor and fuel saving methods which are now successful, simply owing to the unadvanced state of the world's knowledge of gaseous firing and of the mechanical movement of materials.

Having been educated within sight of Watt's factory, where Murdoch achieved success in his gas using experiments, I was induced by association to make a study of the question, "Labor and fuel economy;" but, after many years' work in this field, am beginning to feel that, to do the best work, a man should confine his attention to one of these subjects and limit his work to its application in one particular trade.

Man, as Carlyle puts it, occupies "insecurely enough" his two square feet of ground as a standing place, and that is a very unstable position for any engineer who is inveigled into a talk on modern retort benches. He is likely to be assailed by all sorts and conditions of men, and his theories may bear a muslin-edge by the time the talk is through. For one thing, anybody who ventures to advance a new proposition, or accentuate the benefits claimed for any particular new or ancient method of construction, generally lays himself open to the accusation of being as much an advertiser as the "sandwich man" who struts the streets with boards strapped over his shoulders.

Bearing that in mind, this paper will endeavor to steer clear of all controversial matter and simply chronicle past and present construction matters, using only actual facts and figures in a purely impersonal way. Of necessity I must refer partly to work actually done by myself, as it is obviously the part of this address most familiar to me.

The free-fired bench will be ignored in the following paper, as it should find no place in any works, however small the make of gas. There is no possible defense for the use of a furnace which dispels 30 per cent. of the available heat in the fuel by way of the chimney, and also locates the caloric in an area remote from the retorts. What hope of good results can you expect where 35 per cent. of the ash removed from the furnace is combustible matter? As I shall have to condemn some modern methods, I do not want you to class me with W. S. Gilbert's comic opera man, referred to by him as

> "The idiot who praises in most emphatic tone,
> Each century but this, and every country but his own."

Horizontals.—The past 30 odd years in American retort house practice might be correctly termed, "The age of the half depth six," as perhaps 50 per cent. of the horizontal benches in use are on that principle. When not so well versed in this class of construction, I wondered why the shallow recuperators were so much favored, as in Europe the ¾ and full-depth benches have held the premier position for years, due to the belief that fuel economy can only be gained by having a long and close connection in the separated waste gas and secondary air flues.

Practical experience with this half-depth bench proves why it has been preferred to all others. Personally, I would sooner have it for a moderate size works than any European horizontal I ever saw. It is a good gas maker and, when handled right, it will not eat a hole in your coke pile; but right here it is necessary to say it is not generally handled properly. How many of you users can claim that when your back is turned the stokers give the bench a fair deal? It is a fact that not half of the time does the furnace get good, hot coke feed, which means that there is a loss of nearly 4 per cent. in the heating value of the fuel. There are many ways of arranging very simple contrivances which make it easy to shoot the coke direct from the retort to the furnace, but they are generally not in evidence in the small works. The best arrangement I ever saw is in use at Roanoke, Va., where round bars are hung from above and made with a loop at lower end. To these can be hooked a sideplate, made to go under the top or middle mouthpiece on either side, to rest on the mouthpieces next below. To the end of this plate is added a second plate, which is placed at right angles, facing and leading to the furnace chute, and held in position by a hook-and-eye bolt attached to a bar bolted to the flanges of mouthpieces, the retort bolts acting as a fixing. It is only a little thing, it may be said, but the manager who neglects several little fuel and time saving arrangements, in these days of compulsory cheap gas, will lose the big part of his profits. Let us look closely into this point of live coke furnace fuel. The first, but not the most important, advance gained is a saving in heat and a reduction in fuel. The scheme involves deeper consideration. A bench fired with cold coke generally has, at times, a low fuel bed. Just previous to charging, the coke is at white heat and complete combustion is going on in the furnace, which is then nothing more than a free fire. This will put a great heat on the furnace and perhaps soften the covers, which will allow the retorts to settle along with the sinking blocks. It is a well known fact that a good furnace, charged with hot coke, kept a good depth, will mean reduced heat in the furnace, especially near the crown. That point alone is of sufficient importance to call for the hot fuel plan. There must be a high heat in part of your furnace, known as the zone of combustion, as without it CO cannot be made. CO_2 being the first step in the production of carbon monoxide, it is advisable to keep the exothermic action down near the grate bars and then the opposite action of absorbing heat, which follows where CO is made, will keep the upper and top portions of the fuel from getting too hot. With a well designed grate and the moderate use of steam, there will not be an excessive heat to cause bad clinker formation near the grate bars.

Another disadvantage of the shallow, hot, fuel bed is the chance it gives for the high draft to pull a lot of dust and dirt through the settings and lodge it in the recuperators. One thing you can be sure about, the bench builder is the man who gets the benefit of cold coke firing. Inequality of temperature means spawling and disintegration of the fireclay material, and all hope of a 1,200-day retort life is banished when heats are let down and gotten up quickly, as is inevitable with cold coke firing.

When using coal the general principle remains the same in respect to the deep fuel bed, but additionally it must be arranged to feed the furnace frequently, charging between 100 and 120 pounds of coal at a time. As you will use about 250 pounds of coal per ton, if you carbonize 5½ tons per bench of 6 s per day, the fuel per furnace will be about 1,300 pounds per 24 hours. In actual work this should mean about 10 furnace feeds per day, or say about every 2½ hours. In between times the coking coal on top of the fire should be broken up and pushed back, otherwise the fire will be smothered and cause fluctuations in heat. This is how it is done by Mr. Danatelle at Evansville, Ind., and he, with furnace coal at 85 cents plus 5 cents, has a cost for fuel of about 1½ cents per 1,000 cubic feet of gas made.

It is advisable with coal firing to have a porthole in the front of bench, leading air direct to the combustion chamber, the slide of which is to be opened just after the fresh charge of fuel is made, and be left open to burn off the excess amount of gas made, which will take 15 to 30 minutes according to the class of coal used.

Mr. K. L. Simons, at Birmingham, Ala., works his coke-fired benches as well as anybody I ever heard speak of in the matter. He uses a 370-pound retort charge every 4 hours, 48 minutes, equal to 5 charges per day on each retort. This is a much better idea than the usual 300 to 330 pounds of coal every 4 hours, as it is becoming more evident every day that a heavy charge is preferable to a light one. At Birmingham they could burn off the 370 load in 4 hours, but wisely refrain from so doing and thereby enjoy immunity from naphthaline troubles. They use there 22 per cent. of the coke made, and if we figure 66 per cent. coke to coal used we get by calculation 14½ pounds of coke per 100 pounds of coal carbonized. That is really excellent work for a half-depth installation, using Alabama coal. You will find very few full-depth or ¾ benches doing any better. I usually figure on 28 pounds for direct fire, 16 pounds for generator furnace, 14 pounds for ½ and ¾-depth recuperator, and from 12½ to 14 pounds full-depth.

That brings us to the much discussed question of bench depth. Mr. W. A. Baehr wisely tried to get some standard made by which we could tell just what is meant by ½, ¾ and full-depth.

The half-depth has been with us long enough to defeat all desire for a change in name. The standard is 62 inches from top of foundation to underside of bottom retort, and every true half-depth bench has the recuperators extending up from a paving course on top of foundations. This is clearly shown in illustrations Nos. 1 and 2.

A ¾-depth ought to be 9 feet 9 inches instead of 62 inches, as in

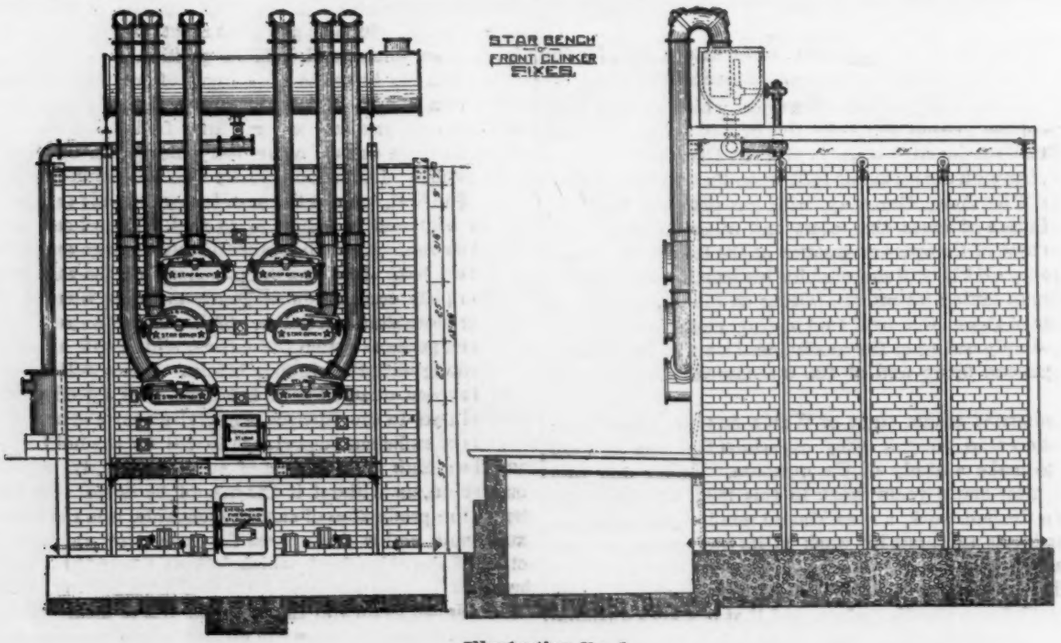


Illustration No. 1.

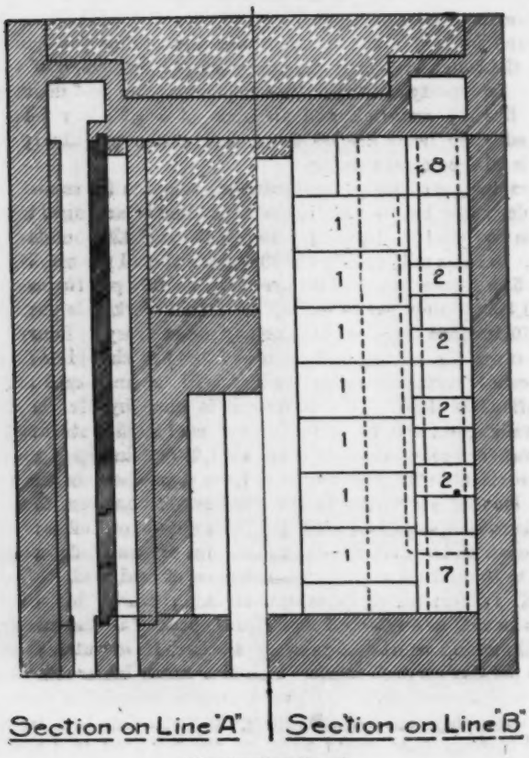


Illustration No. 2.

illustration No. 3, and a full-depth need never be used on 6's. For 8's I show illustration No. 4, as it has the merit of following both Eastern and Western practice.

Writers differ in their views on the minimum depth of fuel required for the constant generation of CO, but fuel depth does not play such an important part in benches as does the design of flues to get the slowest possible travel on the gases. With a minimum depth of 18 inches good, hot coke, we can get a sufficient supply of combustible gas for heating six 9-foot 3-inch retorts, provided we have the outgoing flues and supporting walls so arranged that the gases travel slowly. This depth is not recommended, of course, but is merely mentioned to show that on half-depth benches, with 4 feet 7 inches space for fuel, we have quite as much as we ever need, even when when the furnace is ready to receive the next hot charge. It may be asked, why do some pin their faith on full-depth benches? If for fuel saving reasons, then, I think, they are wrong. Given a furnace, say 3 feet wide and 6 feet 6 inches from grate to underside of roof, which would mean 8 feet 6 inches foundation to floor, you have a gas producer more than sufficient to fill the heat requirements and large enough to cover up the negligence of the stokers. A lot of engineers think the deep bench is a condition rendered necessary by the depth of recuperators. To a certain extent this is true, but only because of a mistaken notion of the function of a recuperator. One of the best gas men in Europe (Mr. Charles Carpenter) has shown us the phenomenal results he obtains with shallow generators. Other prominent men have proved the true benefit derived from the deep recuperator is in the conservation of heat in the arch which would otherwise be lost by radiation and conduction. As we all know, it takes a long time for fireclay to pick up the heat from gas passing across its face, but it takes scarcely measurable time for air to become heated by contact with such fireclay. This shows our aim should be to have a furnace with a good reserve of fuel space, and arrange to bring our waste gas down with a travel back and forth alongside, but not touching, the furnace walls. At the top part provision must be made for the secondary air passages, but there is no need for any very long travel.

In a 9-foot 4-inch arch, 24 feet or thereby is ample, provided the cross sectional area is sufficient to insure a slow movement of the secondary air. This is a positive statement made by reason of actual test on some full-depth 20-inch inclines in 1896. We started with the full complement of flues, but gradually shut passages off one by one till we only had 3 left, and the results were just as good as when the air was travelling over 80 feet in 10 flues. The waste gas flues were left the original length, giving a travel of 84 feet.

The half-depth bench is a capital thing for a small works where it does not pay to put in appliances for saving labor in handling coal and coke. It will do all you require in the way of heating and carbonizing, but will do better if you make a stage floor house 8 feet 6 inches foundation to floor. This does away with what Mr. John Dell happily called "The roasting hole." It gives good air supply to furnace and allows you to draw coke direct to wagons. The half-depth, with pit and floor plates, suffocates the flues and makes furnace operation difficult, tending to shirking of duty by men engaged to shake up grates, unclinker the fires, etc. It may seem like a brewer advocating prohibition for a bench man to go on record as favoring simplified benches and lower capital outlay, but at this juncture I am speaking as a gas man and not as a bench contractor.

Rear clinker benches are excellent in some places, and the only difficulty is to keep alive the fuel which rests on the sloping wall under the firing floor. It is too much to hope that the stokers will regularly dig up and push back this dead lump of fuel. If you build this as a vertical wall, to make all the fuel space operative, it is next to impossible to shovel fuel away back into the space towards the rear wall. The fault lies principally with half-depth furnaces, and on such it is advisable to place the ashpan as far back as possible. To have it only 6 feet long and recess the dip only about 9 inches in back

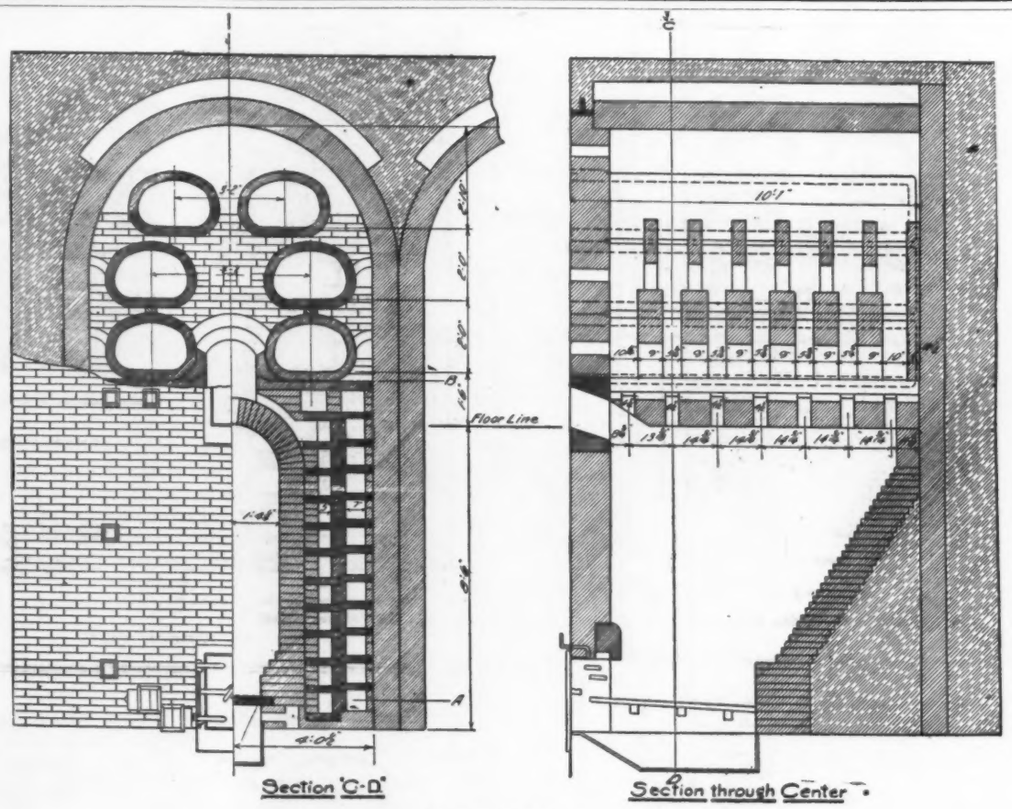


Illustration No. 3.

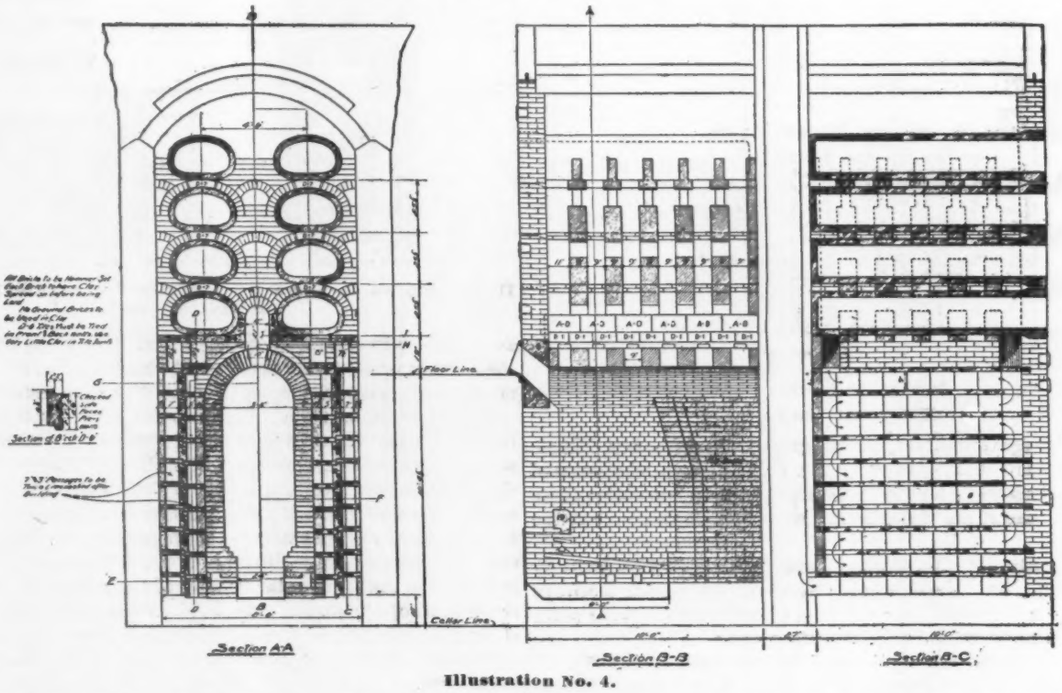


Illustration No. 4.

wall of bench is to court failure from the start. Where coal is used as fuel it is a simple matter to get over the difficulty, and yet, strange to say, there is only known one place where the scheme is in use, and that at the place of its inception. I refer to a rear clinker, rear fired furnace as shown in illustrations Nos. 5 and 6. To Mr. H. O. Channon, and his assistant, Mr. McDonald, of Quincy, Ills., are due credit for this excellent innovation. It is really a treat to see the furnaces at work. They are charged with any kind or condition of coal, about 120 pounds at a time, broken up in the usual way after it begins to coke. There is a 14-inch round hole firing door in the back wall, and level with bottom of same is a floor of wood purlins, resting on cross girders, which carry a wagon loaded with small coal for firing furnaces. I believe the wood strips are about 2 inches by 2 inches, set 1½ inches apart, which gives light and air space to the clinkering floor and also keeps the space above the platform at a good low temperature. These furnaces are "live ones" all right.

It is always interesting to know what the "other fellow" is doing, so with this end illustrations are reproduced of two settings, which are both excellent but vastly different in their designs. No. 7 shows a simple generator with 7 retorts. Whenever you are up against trouble in a retort house, through water or bad foundations, just remember this design. You will see the principle at a glance. Under the top-middle retort is a large block, which extends right to the front wall, where the central hole is open to the air. Here enters the oxygen for secondary combustion, and it travels to the end, where it branches right-and-left, then returns in the two side holes. At several points it spurts into the combustion chamber. The secondary air is heated directly from the furnace gases, and the waste gases,

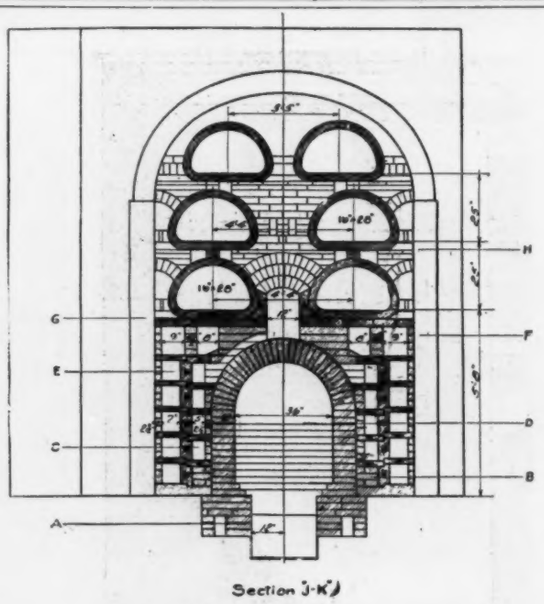


Illustration No. 5.

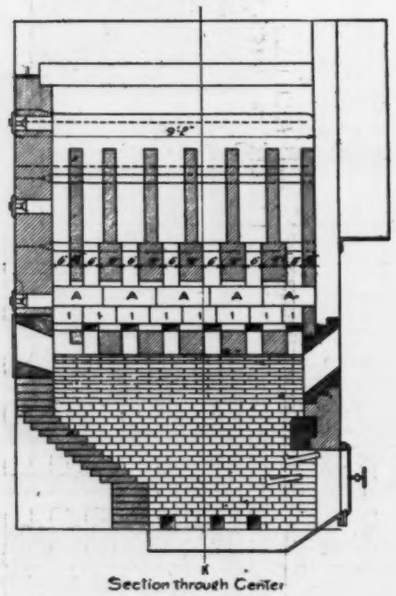


Illustration No. 6.

after their passage round the retorts, go direct to chimney. These benches were built and worked by Mr. John Young, who some of you may have met when he was in Pittsburgh many years ago; those who did knew one of the cleverest and most unassuming men in the gas profession.

The next illustration (No. 8) shows some full-depth 12's, built by Mr. Alex. Yuill. As he read a paper at one of the Scotch meetings describing his benches and their working, I need not discuss the plan, except to draw attention to the brick setting walls.

Just as soon as your minimum make per day goes above 200,000 and you have a chance to consider new plant, then it is time to quit building more 6's. Quite a number of engineers plan to build 9's. This is a good style of bench, as we all know, but it is not to be compared with the so-called "vertical eight." Unless it is treated with the utmost care and attention trouble will arise, and very soon the cost of up-keep will show where the fault is. The "bulls-eye" retort, as we call the one over the producer arch, has not the same chance of withstanding the heats as the others, and the consequence is we often find, after 2 years' work, this retort is in a bad state of collapse. Sometimes it is bricked up and left inoperative, so that the other retorts can be used until such time as they need replacing, but as a rule all retorts are sacrificed because of the insufficiency of the low-down middle.

The main fault with 9's is the small combustion chamber. Eights (that is, the style with the "bulls-eye" left out, see illustration No. 9)

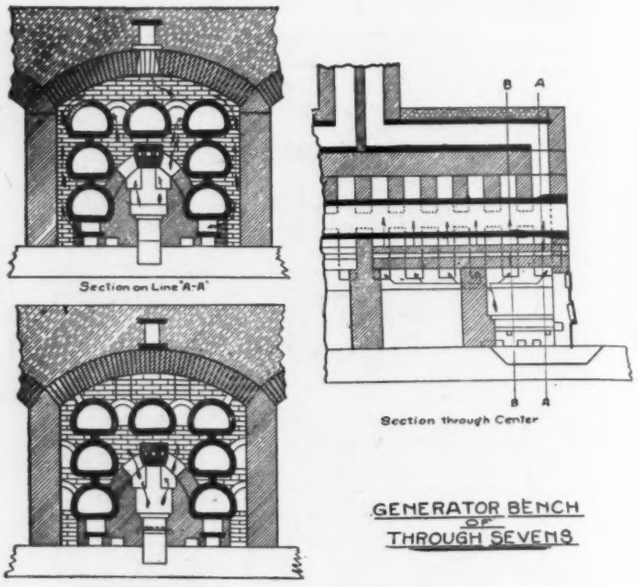


Illustration No. 7.

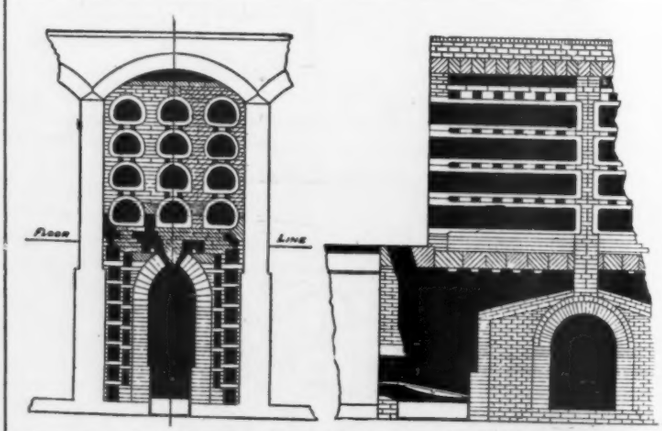


Illustration No. 8.—Vertical and Longitudinal Sections at the Retort Settings at the Dundee Gas Works.

are a little better in this respect, as they give some distance between the point of ignition and the nearest shield tiles; but even this class of bench gives trouble through the middle row of same getting too hot.

It is advisable to adopt the twin rows 4 high for 8's, instead of the triplets 3 high. It saves floor space, simplifies the standpipes, reduces cost of construction, shortens hydraulics. Twins will rest comfortably and behave well in a bed 8 feet wide, whereas triplets require at least 10 feet, and yet in the last arrangement it is impossible to get as large and convenient a combustion chamber as with the 8 feet. Looking again at illustration No. 4, the reason for this is apparent. On that system the heating of the retorts is about as perfect as we can hope to obtain. Mr. V. F. Dewey, who deservedly occupies a very high position amongst Michigan Association members, may perhaps be induced to give his opinions on this bench from actual experience.

What may be considered the only drawback is the distance from charging floor to top row of retorts, making it next to impossible to charge and draw same by hand tools. However, anybody who decides on this style of bench will have machine chargers and drawers, even if they are of the manual description. If the works are large enough, it is advisable, for economic reasons, to go one better than the 4 high twins, and a good example of this setting is to be found under the direction of Mr. W. H. Goulden, of the Gas Light and Coke Company, London. Tens and 12's are quite possible when set in two vertical tiers.

Inclines.—I feel as much as any of you can that my few remarks on horizontals do not by any means begin to cover all the important schemes worthy of consideration, but it is too much to expect the executive of this Association to allow one man to go into lengthy de-

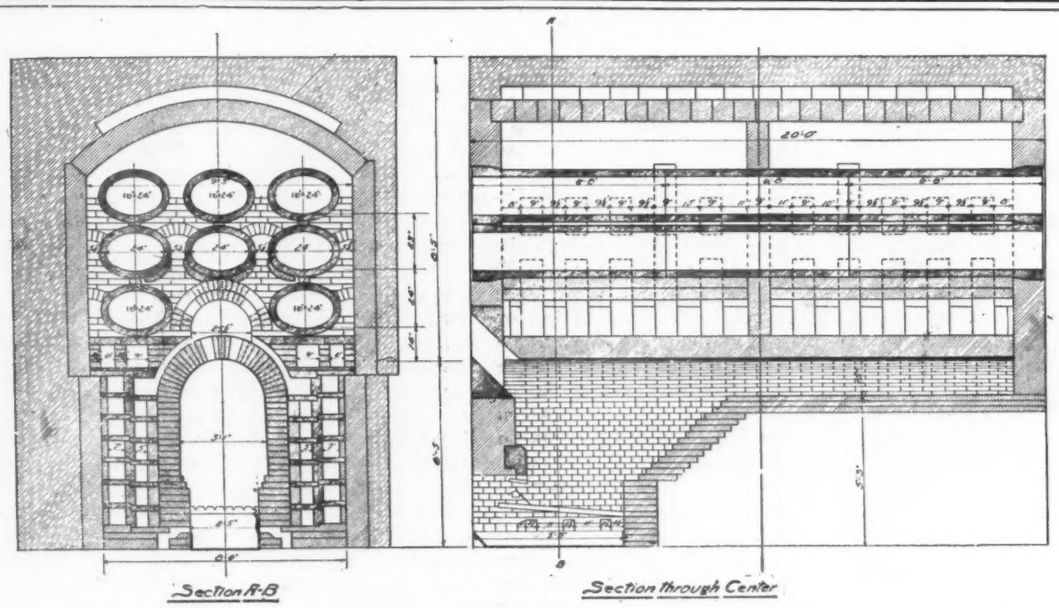


Illustration No. 9.

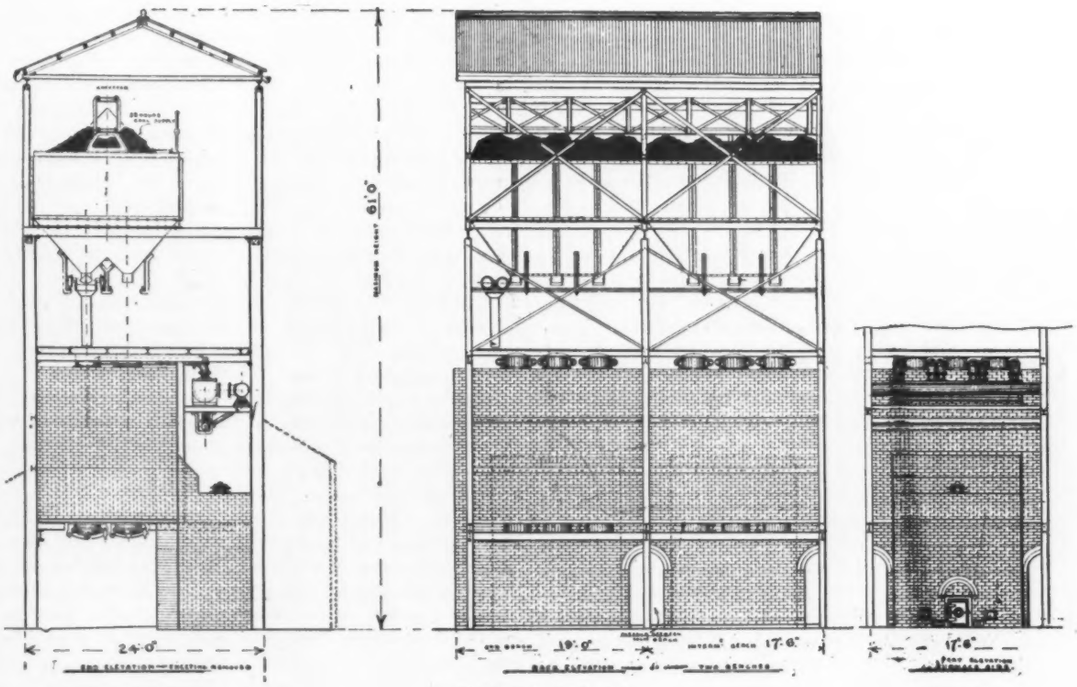


Illustration No. 10.

tails and occupy too much of the limited time at their disposal. Far better to let the foregoing remarks act as an incentive to discussion by the members present, who by long and difficult trials have gathered information which ought to be placed on record for the benefit of the younger members. The modesty of most men, qualified to speak with authority, acts detrimentally at the meetings. We all ought to sink our personal feelings and consult together for the good of the community. At the Michigan meetings there is better work done than at any other I knows of, either here or abroad, due no doubt to the brotherly feeling which is shown amongst the members, resulting in the majority gaining confidence to give their views on important questions.

Dealing now with the question of inclines, it is surprising to find quite a number of engineers who almost consider this system as dead as the Dodo; while on the other hand a second section are only now beginning to realize it is beyond the experimental stage!

I have often wondered why inclines seemed to fall still-born in a country noted for its readiness to accept with avidity all appliances or methods which show promise of effecting savings in costs.

At the birth of inclined retorts, many decided the system was good and in one or two cases put it to the test, but on account of being too anxious to get quick results, the construction and design methods were lamentably lacking in those essentials which are needed for success. It is incredible that some of the best engineers were so easily fooled on this proposition, and it is really by their frank expressions of failure that we are able to gather the reasons for same.

It is well known the original Coze plan was a dismal failure, and no place better realized this than Kensal Green, London, where several stacks were built but failed to work. The same result followed in St. Louis, but whereas on the other side the failure was used immediately as a starting point to reach success, out here engineers saw the reasons for failure even more than those in London, but left the matter in abeyance for many years. Mr. Barret, of Louisville, has since shown what can be done with a good system of inclined retorts, although hindered by local difficulties. I attribute the lack of interest at that time in inclines to the methods adopted in seeking information about the working of actual plants. London looms large in the mental vision of those seeking information concerning plants abroad, and that is just the place where inclines were condemned for purely personal reasons. I refer to the several failures, so-called, of the principle, but really of the constructional method. To err is human, to admit error is divine, but more often we find man makes

his mistake and then his excuse by accusing the principle instead of acknowledging lack of insight into the inherent constructional details.

Inclines are not favored in London, unless we refer to the excellent work of Mr. Shoubridge, at Sydenham. Despite the previous failures in other works, he repeated, in their vicinity, the wonderful results he got at Salford years before. At Brentford, near London, similarly good results were and are now obtained, and recently at West Ham good work has been done; but for all that, visitors go to the larger prejudiced companies for opinions, when for comparison's sake those of the independent and smaller ones are more accurate guides as affecting our conditions.

A point that must never be lost sight of is this: Any works having the equivalent of 12 double benches of 8's can operate equally well with horizontals or inclines, provided in both cases charging machinery and coal conveyors are used; but below that capacity the economy of the horizontal working goes back in great drops, whereas approximately similar low costs per ton are obtained with inclines down to 5 benches of 6's. Even below that inclines show wonderful economy where horizontals could not possibly economically employ charging machinery, and I am convinced 3 benches of inclined 4's can be worked much cheaper than the equivalent capacity on horizontals.

With inclines muscular effort almost entirely disappears, the only hard labor being in clinkering the fires, which is purely a question of getting the right design of grate and producer to eliminate that source of trouble.

Why is it that in England not one inclined plant (outside of the huge failure at Kensal Green and other London works) has been discarded? How is it the system has been extended in old and incorporated into new works? What can explain the putting into use of such plants to save 1 or 2 men's labor at a cost of not more than $5 each?—this is per week and not per day. I have heard it said, "Oh, of course, no engineer who recommends his people to adopt a system can do other than praise it." That is the excuse of the man who does not know and never tries to discover the true inwardness of things. Does it get over the fact that at dozens of plants inclines were put in by an engineer who then left and was succeeded by another who, in one case, wrote voluntarily and told me he had used horizontal charging machinery, at different times, electric, hydraulic, pneumatic and rope driven, and had never been able to get results anything near so good as with the inclines he had been called in to use? These two managers are now in charge of very large works due principally to the wonderful results they got with the inclines.

How is it also that a third engineer at the same plant is now getting better results than the other two, and higher yield than ever was before gotten from that class of coal; and this on inclines built away back in 1896. The people on the old Island are very conservative, to call it by a polite name, but they can be induced to spend thousands of dollars, if it cuts even one man's labor. The gas works' load over there is generally as 2 is to 6, comparing the winter and summer months; and the peak is in winter. It is then most difficult to get men to do the tough work around a gas house. Conditions are bad there in the winter time, but nothing to be compared with what we get here during the peak load season. It is not quite so bad in Michigan as in the South, but you all know what it is to have to take a hand at the retort house work in the hot summer season when men lay down their tools. What would it mean to you if you could go out and get any old kind of a hobo to do a turn in the retort house? Would it not help some to feel that, when in a strait, you could get casual help to make gas at the rate of nearly 150,000 feet per shift per man? Every man you lay off means a saving of about $15 a week, against less than $5 in the Old Country, and yet I will say, even at the possible cost of giving offense, you have not generally shown you realize this. Two retort men per shift and one machine man per day can easily attend to 60 mouthpieces on 20-foot retorts. Dozens of places employ not more than 3 stokers per shift and one coal plant man per day, attending to 48 through 20-foot retorts on 4 to 6 hours' work. Two men on 5 benches of 6's is also a common thing, and on a plant of that kind the average life of a retort is over 1,400 days.

I am not going to enter into a long description on incline construction, as it would do no good. Two things only are actually essential. Good heats, under perfect control, and even charges. Both can easily be obtained (with correct designs) when using any kind of coal, varying in the same works; but be sure and get these, or it is time to prepare your excuses, like the other fellows I have mentioned. Do not expect more gas or better gas from inclines. You can get more gas (but it will figure about 15-candle power) if you use steep retorts and heavy charges, in which case you will be following vertical working. Just as soon as you are allowed to send out caloric feet rather than candle feet, by all means go in for 45° slopers and fill your retorts.

Verticals.—What can be said of the vertical that has not previously been heard? Everybody talks verticals, but few indeed go any further. We hear a lot about the system used in Europe and do not benefit much by it. Conditions over there are entirely different, as they are daily reducing the compulsory candle minimum, and have been for years away below what we are allowed to get down to. Nothing can ever make it clear to me that the continuous process now being tried will succeed until a means is found of getting the coke out automatically without the use of mechanical appliances of steel or iron. There will, first, have to be some phenomenal change in the nature of steel and iron before you can expect a mechanical discharger to work constantly. I have made and installed as many coke conveyors as anybody, and always liked them from a manufacturer's point of view; but I will say right now their use is not to be encouraged unless under very peculiar conditions, which it may be added do not occur here. The moving parts will begin to give trouble right away and in 2 years have to be entirely replaced. The stationary parts are not good for more than 4 years and in the interim need continual patching. This failure of machinery being certain in handling cold coke all in a get-at-able position, and capable of repair during the intermittent stops, what is to be expected when the moving and fixed parts are inaccessible and subject to continual use on solidly packed hot coke, with its attendant water slaking?

Nothing but the highest praise can be given Messrs. Woodall & Duckham for the wonderful demonstrations they have made; but at the same time we do not detract from their work when we boldly face the limits of successful work in automatically handling coke. The coke will not always gravitate to the discharging end. The continuous gas making process has failed on quite a number of differently designed plants, and not yet have we obtained a system which can be looked upon as a commercial success. Woodall & Duckham have done better than anybody else ever accomplished. They have always been right on heating and coal-feeding methods, and deserve great credit for their work. It is the grim determination which they have displayed which has been a factor in all great movements in different branches of life tending to increase moral and physical well-being of the populace. They have something nearly perfect in its ideality, but although they have changed the construction of their discharger several times and have repeatedly battled against the seemingly insurmountable difficulties which up to now have been inseparable from the automatic mechanical movement of coke, we all have hoped they would finally reach success. But our hopes for the ultimate accomplishment must not blind us to the difficulties they have encountered and have yet to overcome. I have not seen, although I have complete reports on their latest devices for accomplishing this difficult discharge of the coke, but it is almost beyond hope to believe they can by a different disposition and method of working old appliances get better results than others. Saying this does not detract from their other wonderful achievements, as many have failed and continue to fail in trying similarly to surmount these insuperable difficulties. What Glover and West will finally do is a matter of conjecture. At the time of this writing they are making tests on good coal at St. Helens. They have gotten good results with poor coal, and I am told privately by one of the best gas men in England that, "we will be shown" when they report the results obtained on good coal.

With the intermittent vertical this element of failure is not a factor in the success or non-success of the system. The inventors and users of the Dessau and other German systems have demonstrated what nobody ever doubted. They have made a success of what many have tried, but unlike those trying for continuous work, have not endeavored to do what has never before been accomplished. It was not news to us when we were told a heavy charge of longer duration would give us more gas of a poorer quality than our older systems disclosed. We could calculate also that better coke and other by-products were likely to follow this system of operating. The great merit attached to their case is the actual demonstration on a large scale of the desirability of going out to get such results. There are many men in this room who could do as good work, but the conditions they have to comply with make it undesirable to attempt success on similar lines.

Construction Methods.—There is no more important consideration in bench work than the one of construction. Design is important in

two ways: We can have a bench theoretically perfect in its dimensions, and particularly in the size of the flues, disposition of retorts, and such like. If that was all we had to take care of, any moderately skilled draftsman could show on paper a scheme in which every flue would be worked out in size and shape with mathematical accuracy. Again, we could have planned out for us a similarly good bench in which the various parts would be accurate as regards their size, and which, if built right, would be good at the start and for some months. That satisfies some salesmen in the bench business, but it lays the way open for trouble, in the near future, for the user.

A successful bench designer and builder must study and know men more than matter, but he must also, of course, be very familiar with the materials he has to use. His knowledge of the first must be first hand. In the second case, it may be he can use to advantage the experience of others (as in my own case), and in this respect I look forward with the keenest pleasure to the results of work in this line which are to be presented at this meeting by the Managers of the Detroit Gas Company. When saying man must know men, it is meant that when you design a bench you want to be sure it can be, and is going to be, built as you design it. The mason you can get may be as good as the next, but he is not as a rule a man highly skilled in reading drawings. Then again, he may know how and yet not act up to his knowledge. This is, to a great extent, due to very keen competition in the bench business, which makes most bench contractors rush their men to keep the labor cost down to the estimate.

Construction, then, while human nature remains as at present, should start from this viewpoint. Get your design right as regards flue sizes, retort number and disposition, and then reduce the elements of construction to the most simple in shape and number, suitable for the situation, but at the same time also suitable for the man who has to assemble them. Give a good mason (or, as it is preferable to call him, a retort setter) a quantity of brick of varying thicknesses and he will lay them up in almost any desired shape. Cut out the blocks and tiles as much as you possibly can. Believe me, this is no attempt to foist on you any pet theory of my own. It is a very earnest attempt to show you the advantages of the old and tried method of construction. I use the idea myself because I think it the best, and service proves it to be the best. Here is the actual written expression of an American gas engineer now located in Europe, who has for over 7 years turned out over 4,380 millions of gas per annum, and who in 7 years has increased his annual make by over 300 million cubic feet. Does it not make your mouth leak? Remember, he has used the block system here and in Europe, both on horizontals and inclines, and after that he writes: "I agree with you that the block system of settings for retorts is rotten." It is strong, so I will not mention names. It is not exaggerated, as truth needs no emphasis. It will not do me any good for you to recognize this, as it means making the gas manager to a certain extent independent of the bench contractor. The use of brick settings will give you a better job than if you adopt the Chinese puzzle blocks, which are now offered in some cases, and will enable you to keep a stock of material in the shape of 9-inch brick, with some plain tiles, and be ready to reset a bench just as quick as you can get the stock retorts from any maker. In that respect the European gas manager is ahead of you. He can order his retorts by wire, use his stock brick, or buy a new lot and reset his own benches, or let it out on contract. He gets at least 1,200-day life on his retorts. Honestly, now, do you do as well? No, sir! Why is this the case? There are a great number here who have it on their tongues to answer, "Higher heats here." That is the argument of the bench builders who have been forcing you to take block settings and who, in most cases, refuse to sell you a design and material for you to erect yourself. It is said, "Faithful are the wounds of a friend." If the statement hurts, you must look at it in that light. I know the heats here are not higher than where the 1,200-day life is gotten out of a retort. It is not a case of the clays being inferior here. Europe cannot mine clays such as are found in Missouri, and known in the respective cases as "pot clay" and "flint clay." There is a reason, of course, and it all resolves itself into that old and familiar factor, "the man." Give him blocks and tiles to set up and he will do good work in its way, but there is not a mason living who could be allowed, even if able, to cut and rub down into place a badly fitting block or tile. The maker cannot make a large fireclay shape so accurate that it will turn out, every piece, to limit gauges. There is no mason living who could correct the errors by cutting the tile, even if he had the time. Neither the tile, the retort nor the man are built that way. The American bricklayer can lay brick while the next one is breaking the laws of the anti-spitting league, but he has his limitations. His work is too often gauged and approved by the 9-inch equivalent laid. That is all right on red brickwork. It will not go on retort setting. Give him a design in detail calling for bricklaying and he will beat the world in speed and accuracy. Why, then, not do it? At present he is given large blocks, which, in most cases, have to be cut and in others are small at the start, so he is then doled out ¾ clay and ¼ calcined ground brick, which he uses for slush to fill the original crevices or those made by irregular cutting of the block or tile.

If you use brick in the setting walls—I ought rather to say wherever you use brick—see they are laid up right. Test all work done by trying to insert a pocket knife blade in the course joints. Use the little blade at its sharpest. Do not fire a bench which has joints allowing the knife blade to enter the joint between the bricks. No—"fire" the mason before he has time to perpetrate such a palpably bad piece of brick laying.

Here is another pointer. Cut out the "grog" in your mortar. I know it is not easy—in fact it makes one very uneasy to contemplate—in refilling an old arch to have the mason work true to his needed levels with the necessary thin joints. Still, let it be repeated, "Cut out the grog." Get the habit of using splits. Mostly you are furnished with standard square brick and 1½-inch and ¾-inch splits or "cones." That is all right, as far as it goes, but it will not make a contractor with the "Marathon" distance commercial life. To get the right steps for making a winning run in the strenuous struggle for commercial success in the gas bench business, a contractor must go by easy stages in his brick sizes. In other words, if his bricklayer finds his work is laying up to incorrect heights, he must have the means of making it right. Grog is a subterfuge. An unstable setting for a retort or furnace cover results, when grog is used in bringing the levels rights. Get instead a split brick or a scone and if you have ½ inch space to fill, use a ½-inch split. You can get to any height you want, if you have a supply of ½-inch, ¾-inch, 1-inch, 1½-inch and 1½-inch splits. You are debarred from such methods where you use blocks for furnace covers. If any of you are resetting now with blocks, go right to your retort house when you get home and watch the results. Have you ever seen a mason try to bed a "wobbly" block? You know the kind I mean—one that fits where it touches and seems to be stubborn about coming into contact all over in each part at the same time. Do you recollect any broken pieces of slate lying around your resettings? Many is the time I have seen slate slipped under a rickety block and then the whole thing slushed up with grog and fine clay. It looks good too, but it is the curse of the bench business when such practices are employed. An hour in the retort house is worth two in the laboratory when your benchwork is being done.

Beware of the mason with the big trowel. He is a real good fellow whose chief aim is to do quick work and save on construction expense. His praiseworthy but misguided ambition is to spread clay quicker than before happened and lay more brick than the last man who perhaps was content to lay say 1,500 a day. He is such a good natured fellow he would hate to hit a brick for fear of cracking it! He just loves fireclay, thick and juicy! Do not discourage him by a speedy discharge, but get rid of him quick and send him where he belongs, back to the arms of his natural friend and protector—the builder of cheap apartment houses. Then seek out a man who will "dip" each brick and hammer it down hard. For my own part, I do not care much about dipping bricks. The mixture of clay to be used is only right for dipping when it is not just right for quality. It is preferable to "butter" each brick with a good mixture, such as fine ground fireclay and silica sand of a suitable quality and grain. A man used to this method will show the aforesaid easy-going man of the 14-inch trowel where to get off when it comes to quantity of brick laid per day, and the bricks will be laid right.

These are only a few hints on bench building. They only just begin to cover the subject and do not by any means fringe on the point of view of the contractor and methods he ought to use in handling materials on large contracts. I have tried to just say enough to get you thinking more seriously about this important subject. We are all here to learn, and a question of this kind, when ventilated, gets many good men to work on new and improved methods, which may, and in fact ought to, result in something far in advance of anything advocated by the one who broaches the subject. Looking back on the wonderful work done by members of this Association in the past, I feel positive, if they give some special consideration to the several points I have raised, it will be greatly to the advantage of us all, whether purchaser, user or contractor.

It was my intention to go into the ironwork designs, but already

the paper is too long. Attention should, however, be drawn to the fact that when you need new benches it should not be your only aim to dissect the designs of the brick and clay work. There is room for very great improvement in many parts of the ironwork. Study well the stomach and heart of your bench, such as the furnace recuperators and retorts, but do not lose sight altogether of the lungs, which in this case are the standpipes and hydraulics.

I hope for a long and interesting discussion, and may say this is my primary reason for the temerity shown in airing my views before you. If such are wrong, it is best to know where and why. The gas bench men have not any claim to exclusive knowledge of stack construction, but we must all feel it would be to the benefit of the whole profession if some of the users would help all they can to improve the useful knowledge on bench working. Who is better able to tell us our faults and show us how to correct them than you practical men who live with and by the aid of the coal gas bench. We go on designing until we get into a kind of rut. Let us have new ideas, novel or interesting suggestions. Get rid of any suggestion of apathy. For the sake of the trade which we work in and the profession we all struggle so keenly to keep improving, let us not even appear to stagnate.

In this connection, and as a fitting conclusion, I wish to refer to the suggestions made by Mr. V. F. Dewey, on the form of brick setting walls for the retorts he has in use. As a skilled bench designer said to me when he saw the idea drawn out on paper, "It is something we have long felt the want of, and will all benefit by using; but it is really so simple it makes a man wonder where his brains were for it to have escaped his attention during so many years."

Tools of the Shop.

[Communicated by "R."]

The tool room of the gas works is of more importance to and should receive greater attention than is usually given to this department. The writer, who has been visiting and investigating the tool rooms of gas plants, found a few very well established and completely equipped tool rooms in some of the plants. In fact many of these plants, of later build and design, were outfitted with a number of pieces of modern-machine tools, such as turning lathes and drills. In one of these the arrangement of the shop appeared to be perfect. A man was in charge who kept tally on all tools and devices in use, and the shop and its fittings were inspected regularly. Only high grade tools were bought and put in, and in these days of advance on those lines one has merely to think of the Mueller Company and his wants can be readily met. Such a shop is a credit to the gas plant, for it makes it possible for the workmen to attend to any repairs needed. Something may break down in the equipment of the plant, so with the necessary tools and contrivances, the repairs can be effected without delay. It is not so with the poorly fitted plant. While I found a number of very creditable tool rooms, properly arranged and cared for in some of the up-to-date gas plants, I found many places in which no attempt whatever was made to support a well equipped shop. It was easy to distinguish the difference.

In the one, perfect order prevailed, and any desired tool could be obtained quickly; in the other, time was lost and annoyance experienced in getting hold of the required tools.

One of the first essentials towards procuring the right kind of a tool room for the gas plant involves the selection of the tools. There are men who insist upon saving money by purchasing second hand materials. They imagine they are saving money for the company by looking through the junk shops and the second-hand tool shops for bargains. I met one man who boasted about saving a few dollars for his company by going through auction rooms and abandoned shops for the purpose of picking up tools at low cost. These tools were taken to the shop of the plant, and the machinist was directed to fix them up. The machinist saw that the buyer was enthusiastic over his supposed bargain and said nothing, but went to work and made repairs. By the time the tools and devices were in suitable condition for use the labor and repair material required brought the cost up to the price of new tools. Still the buyer gloated over his shrewdness and no doubt received praise from the superintendent. The average manager of gas works desires to encourage economy in the tool room; but he seeks to do so without cost to the plant and the works. If second-hand tools are purchased the chances are that the tools have outlived their day. Some of the second-hand tools seen by the writer were carrying split handles, as in Fig. 1. In order to make the tool presentable, the handle is wound with cord or wire. In time the cord or wire stretches or breaks, then the handle opens again and the tool becomes useless.

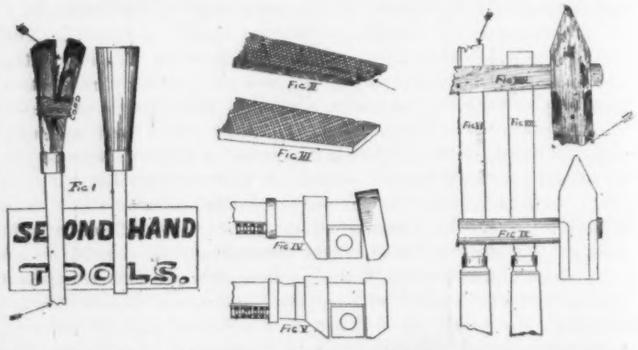
Again, when you buy a second-hand tool of any sort, the liabilities are that its edge is gone, as indicated by the arrow. This requires regrinding in order to square the edge. The grinding may remove the temper and then retempering will be necessary. After the expense of getting the old tool in shape for service is considered the tools costs almost as much as a new one of the same kind.

Files are used to considerable extent in the mechanical departments, and all kinds of these may be seen in service wherever there are gas fixtures to make or repair. The meter repair shop has to be furnished with a full set of flat, round, oval, half-round, diamond-shape and other designs of files, of various numbers of fineness and coarseness. The file should be perfect in every detail. Yet in my travels I discovered a number of "job lot" files in the shop of a gas plant, the points of which were broken off, as in Fig. 2, or the edges in bad condition, the handles missing and in a generally disordered shape.

Of course this was the result of the "findings" of an enterprising buyer of second-hand apparatus of the works buying up a lot of old truck, and the discarded files happened to be in the consignment. The workmeu told me, behind the back of the foremen, that it was a disgrace to the works and a loss of time and money to use these files.

Then, there are the wrenches, many styles of which are needed in the modern gas works, as is well known. Some of these are of the "flat," "S" and curved style, while others are of the common monkey-wrench type.

In one lot of monkey wrenches purchased by the superintendent of a gas works' plant, the heads of the wrenches expanded outward, as in Fig. 4. It may seem strange to mechanics, but this wrench was in use and it caused hard words in many and "cuss" words as well; but the wrench was there. It had to be used because a perfect wrench was not available at just that time. Of course, the jaws of the



wrench slipped on the nut. Furthermore, the corners of many of the nuts were permanently injured by the abrasion of the free jaws. Fig. 5 shows the same wrench after the jaw shaft had been removed, heated and straightened. If you can remove a defect in the tool like this, then the tool may prove to be useful.

Fig. 6 shows the point of a worn screwdriver. Of course, you can grind down the blade and get a square end, as in Fig. 7, with little effort and make the second-hand tool do for a little time longer.

In a certain gas works I saw a party hammering with a hammer head in the worn and rounded shape shown in Fig. 8. The hammer head not only damaged the work, but it often slipped off. This was fixed by cutting off the hammer face so as to shorten it, but leaving it smooth and square, as in Fig. 9. Very many good second-hand tools can be purchased; but you are taking chances. Some old tools can be restored to working condition; but this takes time.

Men who buy tools for gas plants prate of bargains they have made with bankrupt concerns. It is true that some good job lot tools can be had under these conditions; but, as a rule, the discarded second-hand tool is about done for and should be avoided. The safest way is to buy modern tools straight from the makers. You then get a perfect tool and of recent pattern.

Pre-Heating Air Supply to Bunsen Burners.[1]

By H. James Yates, F.C.S. of Birmingham.

I have been very much interested in he statements which have recently appeared, both in the *Journal* and also in connection with manufacturers' advertising matter, in regard to the percentage of gas which can be saved, particularly in gas cooking ovens, by preheating the air which is supplied to the bunsen burners. We have just completed some searching tests in our laboratories in respect to one apparatus of this kind which has lately been brought prominently before the public notice, the results of which I believe will prove of interest.

1. *Journal of Gas Lighting.*

I was convinced, as the result of our previous work and experiments in this direction, that the statements to which I have referred were excessive. I did not, however, anticipate that these were so wide of the mark as they have proved to be by our tests, which are set forth in the following figures:

Mean temperature—	Oven as Sent out by Makers Arranged for Pre-Heating Air Supply to Bunsens. Deg. C.		Ordinary Gas Cooking Oven with no Pre-Heating Arrangement. Deg. C.	
At top of oven	246.4		249.7	
At bottom of oven	230.6		282.2	
Of escaping products of combustion at flue	117.0		161.4	
Between walls of oven where air is pre-heated for supply to bunsen burners, right hand side	162 2		....	
Do., left-hand side	153.0		....	
Of outside walls of oven, right-hand side	74.4	Mean 77.9	55.6	Mean 57.5
Do. left-hand side	81.4		59.4	

During the whole continuance of our experiments, the calorific value of the gas was taken from time to time and averaged. From the figures thus obtained under readings (after correction to 0° C. and 760 mm.), the number of B.T.U. used per hour was calculated. The burners of the oven supplied with pre-heated air were left as sent out by the makers; but in the case of the oven which we used for the comparative tests, they were adjusted so as to consume exactly the same amount of gas per cubic foot of oven space as the oven with pre heated air.

In theory, and under particular conditions, the pre-heating of air for the supply of oven burners is not without a certain advantage. But, unfortunately, it is not practicable on a commercial basis to construct cooking ovens and similar low temperature apparatus with that degree of refined exactitude which is absolutely necessary to attain the desired effect; and, therefore, any increase of value gained in this way is necessarily too small to be of much practical use.

Referring to the foregoing figures, it will be noticed that though the mean temperature of the interior of the ordinary oven was 50° C. higher than that of the pre-heated oven, the temperature of its outer surface was 20° C. lower. This means that with the pre-heated oven there is considerable loss of heat. This fact, which may at first sight seem difficult to account for in face of the economy intended to be effected by the pre-heating, is less difficult of explanation after allowance is made for the unavoidable admission of extraneous air which is not pre-heated, and when there is taken into account the greater loss in radiation on account of the higher temperature of the outside walls of the oven, which has no non-conducting jacket beyond the pre-heated air that is on its way to the burners. This increased loss in radiation was a result quite to be looked for, having regard to the fact that the air-jacket is not a sufficiently good non-conductor, and allows heat to pass through it to the outer walls of the oven. From there it is lost by two means—convection and radiation. The loss by convection is considerably more in the pre-heated oven than it was in the ordinary oven; for while both ovens were continuously heating the air immediately in contact with their outer walls, the pre-heated oven, on account of the higher temperature of its outer walls (owing to the absence of the slag-wool jacket) was raising this outer air to a temperature anything up to 20° C. more than was done by the ordinary jacketed cooker. The difference between the respective losses by radiation—such as these losses are—is, of course, very much greater than that between the respective losses by convection; being, in fact, proportional to the difference between the fourth powers of the absolute temperatures.

These tests confirm the view that any small initial gain from pre-heating the air for the cooking oven burners is more than neutralized by the loss in other direcions.

The Necessity of Intelligent Engineering in Reinforced Concrete Construction.

Mr. D. C. Newman Collins, writing in a recent issue of "Concrete Engineering," remarks: An engineer, having had a broad experience in both engineering and contracting, once explained how differently he looked upon the process of construction of a concrete structure. As an engineer he would look upon it with keen interest in the method of laying and the generalship and skill used in making good results. He would carefully note faulty construction and the cause and would make elaborate notes of any brilliant scheme for economy or perfection in results. As a contractor his whole view was embodied in one remark, "Look at those men soldiering." The engineer looks upon work from a general view of quality, method and cost, while the contractor considered it entirely as a matter of dollars and profit.

There is no type of construction more difficult to make right or more variable in cost than reinforced concrete. Success is only assured by the accurate and skillful mastering of every detail of process and in using material that is chemically and physically suited to the work. Blunders and carelessness are hazardous; mistakes are buried and sometimes only become evident through disaster. As far as stability is concerned, even with the greatest accuracy being observed in the construction, concrete has to be tenderly cared for as a baby, until it develops strength to protect itself. A strain that will produce fracture during its infancy will never mend. Once broken, always broken, is the characteristic of the product.

Concrete, reinforced with steel, carries with it undisputable recommendations that we cannot cast aside. It has come to stay, and the unusual difficulties attending its proper use should not discourage the adoption of this type of construction, but should, and will, develop means to safely overcome the possibility of dissatisfaction.

It has passed its infancy and is now entering the arena as a worthy competitor. As the result of what we may term its apprenticeship, we see concrete work that is a work of art, almost a classic, and beside it is work that looks like a mud house. We have read of success and of failure, of satisfaction and disaster, argument for and influences against it during its great race for supremacy. The objections are founded upon the abuse rather than the use of concrete.

In some cases it seems to be a fault of ours that we measure things so often in dollars, and yet we are unwise enough to weigh a subject entirely from the number of dollars that appear on the surface without looking deeper for the real value. The superficial value of the work, as represented by a bid for its construction, is really secondary to its actual cost in efficient service. Our keen search for dollars has many advantages also. Good engineering means the accomplishment of work for $1 that anybody can do for $4 or $5, but it does in no instance involve the indorsement of cheap work. The dollar instinct of any owner will appreciate the recommendations of any engineer who has skill enough to point out where he can spend $100 more that will save him $1,000 in maintenance of the work after completion, or where the saving of a few dollars in first cost may jeopardize the safety of a thousand in after repairs and inconvenience.

It is hard to believe that there are keen business men who expect to get good and economical building work by taking advantage of a contractor who has omitted something from his estimate or who has not had enough experience to know what the work will cost, and yet so many of them will receive the lowest bidder with open arms because his interpretation of the requirements is lower than others and regardless of his ability to do good work or any consideration of the real value of the work as it should be done.

Such an award of work is done blindly and mostly carries its own penalty. How often have we seen an owner repairing new work before occupancy. Not only the new repairs have to be paid for, but the expensive tearing out of work already finished that could so easily have been made right in the first place if it had been noticed.

These considerations lead particularly to the necessity for wholesome methods and harmonious energy being applied by both a skilled engineer and an experienced concrete contractor to safely complete a good reinforced concrete building. Any wrong method of construction, errors in dimensions, imperfect material, harmful economy or other improper details of administration can so easily and cheaply be made right if made evident at the right time.

For comparison, look at the amount of money spent on our steel structures to be sure that every detail will be amply strong to do its work safely. After the design is made, skilled engineers work over the detail drawings and record every detail to a single rivet and verify its accuracy before the shop begins to make it. Each and every piece of material is worked out, and the drawings serve as the only basis for making and shipping the steel, which simply has to be erected as it is made. Money is also spent in shop inspection to see that the steel is manufactured as specified, and this inspection goes on to the completed structure, so that there is practically no loophole for errors to creep in. This is expensive, but it is safe and necessary.

In violent contrast, consider the life of a reinforced concrete structure, where the quality of material is uncertain; the results of labor simply unknown; where there are so many kinds of material to be inspected and the chance of error ten times greater than in steel and more difficult to control. Where the manufacture is not done in a shop equipped with organized men and under known conditions of detail that cannot be departed from, but in a new field where the

conditions are new and untried; where the equipment has to be improvised for the special conditions and the work executed by men of unknown qualifications and who generally know little about the requirements and sometimes care less. This is the outfit usually depended upon for success and without substantial precaution to see that their work is properly carried on.

The majority of labor on a concrete structure is uneducated and unskilled, made necessary by the prohibition of cost of skilled men to fill a laborer's place. Amid the confusion of actual work, the grind of the mixer, the roar of the hoist and the scramble of men wheeling plastic concrete there must be a cool, vigilant and rigid generalship in the administration to avoid errors creeping in.

This generalship should be covered by the engineer, together with the contractor working for mutual success to become an ideal. The commercial interest of the contractor should never be allowed to influence doubtful methods nor the preliminary designs of an engineer prevent modifications to suit unexpected brands of material or unknown conditions that should demand the consideration of changes in design. Working harmoniously, one will help the other, and the work will reflect the advantages of having a government from two points of view.

The owner will perhaps consider that he does not have to pay a lot of money to an engineer when the contractor will do the entire work. It is true he does not have to, no more than he has to pay a doctor or a lawyer; but from his experience in these lines he finds it great economy to have them. The need of having a doctor or a lawyer is more evident at the time they are needed, while the benefit of a skilled engineer's guidance is not always so apparent until it is too late for him to do much.

This does not imply dishonesty in the actions of a contractor when he tries to squeeze a profit out of his work. It should be remembered that this is an important part of his business, and the nature of the inquiry for him to bid in competition is clearly a challenge to beat others, and in doing so his values of the work must be kept down. His limit is to fulfill the legal requirements as cheaply as he can and to exclude any charge that is not clearly required. He has a few hours to estimate and months to repent.

Litigation is more often the result of misunderstanding and uncertainty than of error. It results very often through unfair demands from an inexperienced buyer or superintendent, and sometimes through dishonest motives of the contractor. It rarely occurs under skilled engineering management.

How often a leader in commercial life will point with pride to his purchasing department as being such a splendidly organized staff that knows all about the material to be bought, and, although expensive, what a good investment it is. The very same man will sometimes launch a big building enterprise in a most careless and thoughtless manner, without effort to prevent mistakes. He will pay fire insurance premiums for years on an almost safe risk and yet venture into new construction of equal value where the speculation is many times greater, without protection or apprehension.

Taking all points into consideration, the success of a reinforced concrete structure is best assured by the harmonious and co-operative criticism from a technical, physical and commercial point of view, that will "smoke out" errors by anticipating them. That will promote proper and economical methods, tending to reduce the ultimate cost of the work; that will secure an administration that will effectively safeguard the buyer's interests throughout and secure wholesome and satisfactory work.

Good engineering is more a necessity on concrete than on any other type of construction, and when loyally and skillfully devoted to the work will surely prove the very best investment in money. An engineer with commercial experience knows what work should cost before contracts are considered. He effects economies at a time when the owner can get the benefit of them. The owner has this information, and with it a happy feeling that he knows he is buying right. He feels sure that the goods are delivered before bills are paid. He is free of legal entanglements because there are clear records of what he has bought, and the contractor knows exactly what is to be done before he starts. There is, consequently, the greatest freedom from friction and worry and the greatest pride in gratifying results, with very little of the speculative atmosphere usually attending a building enterprise.

Coke Production in 1908.

The report by Mr. E. W. Parker, of the United States Geological Survey, on the manufacture of coke in 1908 is in press as an advance chapter from "Mineral Resources of the United States, Calendar Year 1908." According to this report, the combined production of beehive and retort oven coke in the United States in 1908 amounted to 26,033,518 net tons, valued at $62,483,983, against 40,779,564 net tons, valued at $111,539,126, in 1907. In the earlier year the production exceeded all previous records in the history of coke making in the United States; the average price per ton in that year was also the highest ever recorded. Compared with 1907 the production in 1908 shows a decrease of 14,746,046 net tons, or 36.14 per cent., in quantity, and of $49,055,143, or 43.98 per cent., in value. The average price per ton at the ovens declined from $2.74 to $2.40. Of the total 1908 output 21,832,292 tons, or 83.86 per cent., was produced in beehive ovens and 4,201,226 tons, or 16.14 per cent., in retort ovens. The decrease in beehive coke from 1907 was 13,339,373 net tons, or 37.93 per cent., and in by-product coke 1,406,673 tons, or 25.08 per cent.

The quantity of coal consumed in the manufacture of coke in 1908 was 39,440,837 net tons, valued at $45,222,474. The value of the coke produced from this coal was $62,483,983, a difference of $17,261,509, which, less the cost of manufacture and the expense of administration, etc., represents the profit on the coking operations. In 1907 the the value of the coal used was $72,784,851, and the value of the coke produced from this $111,539,126, a difference of $38,754,275.

Notwithstanding the decrease in production in 1908 as compared with 1907 there was an increase in the number of ovens from 99,689 to 101,218. Of the total number of ovens 12,920 were idle throughout the year 1908, though many more were out of blast for a good portion of the time. In 1907, out of a total of 99,680 ovens, 4,934 were idle during the year. The average production of the active ovens was 294.8 net tons in 1908, as against 430.4 tons per oven in 1907. The average production for each beehive oven for the last 4 years has been 365.8 tons in 1905, 373.6 tons in 1906, 386.8 tons in 1907, and 258 tons in 1908. The average production for the retort ovens in the same years was, respectively, 1,158.8, 1,356, 1,472 and 1,142 tons. In 1905 the average production from by-product ovens was a little more than three times that from beehive ovens, and in 1908 it was nearly six times.

Coke Making in By-Product Ovens.—The year 1908 was not marked by any notable gain in the construction of by-product coking plants, though some new work was done. There was a net increase of 115 in the number of completed ovens in 1908 over 1907, the totals for the 2 years being, respectively, 3,892 and 4,007. The additional equipment consisted of 140 Koppers regenerative ovens built at Joliet, Ills., by the United States Steel Corporation, but this increase was partly offset by the dismantling of 25 Semet Solvay ovens at Sharon, Pa., the net gain being 115 ovens. Included in the total of 4,007 completed ovens in 1908 are 152 Newton-Chambers ovens at Vintondale, Pa., but as no recovery of by-products was made at this plant in 1908 the production of coke is included with that from beehive ovens. The 56 ovens of the same type at Pocahontas, Va., have not been in practical operation since they were first installed. In addition to these there was one other by-product plant of 120 ovens that was not operated during the year. The number of retort ovens producing coke in 1908 was 3,679, as compared with 3,811 active ovens in 1907.

The construction work on plants that were not completed at the end of 1908 consisted of 140 additional Koppers ovens at Joliet, Ills., 50 United Otto ovens at Kokotto, near Cincinnati, doubling the plant at that place, and 50 United Otto ovens at Indianapolis, Ind. The last mentioned are the first by-product ovens to be constructed in Indiana and they will probably use West Virginia coal.

The Refining Industry.

At the recent Drake Memorial Banquet, Mr. T. B. Westgate, of the American Oil Works, Titusville, Pa., thus spoke of the oil refining industry:

I am a better refiner of oil than of refined eloquence, so I shall be obliged to confine myself in the little I have to say to plain statements concerning the refining industry.

It may interest some of you to recall that some years before petroleum was utilized there were a few refineries busy distilling coal oil from shale and from coal. There were about 50 of these refineries located in various parts of the United States in 1859. The first petroleum refinery was built at Tarentum, Pa., in 1850, by Mr. Samuel Kier. Mr. Kier owned salt wells, and he was greatly annoyed by a greasy substance mingling with the salt water as it was being pumped. Finally, being impressed with its oily nature, he employed a chemist to test it. After various experiments an oil was evolved which would burn in a lamp, and this marks the first chapter in the refining of petroleum.

Soon after Col. Drake's great achievement, which resulted in loosening the sealed up fountains in these Pennsylvania hills, refineries sprang up like mushrooms all along the Oil creek and Allegheny valley, and north of here in Union City and Erie. Of course, their first efforts were experimental and seemed almost ludicrous compared with the refining methods of to-day.

On the 6th of November, 1860, work was begun on the first refinery in Titusville. The owners were William H. Abbott, James Parker and William Barnsdall. In 2½ months after the beginning of the erection of the refinery, fires were lighted under the stills and the refining of oil was begun in Titusville. The whole refinery was built in less time than it now takes to build one good sized still. Since that time there have always been oil refineries in Titusville, running day and night, year in and year out pouring out their rivers of refined oil to light the world. I might also mention that they have poured out various odors, and occasionally a very little black smoke. I think the petroleum odors have somewhat endeared themselves to us, for when one is away from oildom, a whiff from a passing oil train (while not exactly suggestive of roses) is sweet with memories of dear old Titusville. And the smoke! I think my neighbors can discuss more eloquently than I upon that topic.

In these first refineries of early days, the capacity of the stills ranged from ¼ of a barrel to 10 barrels. The owner of a ¼ barrel still actually exported oil to England. To-day one of the great refineries owned by the Standard Oil Company has an output daily of 25,000 barrels of refined products alone. The Standard Oil Company have now about 30 refineries, and there are about 100 independent refineries located in the various oil producing States. It is estimated that the independents represent about 20 per cent. of the refining interests of this country. Inasmuch as the United States produced in 1907 over 63 per cent. of the entire crude oil production of the world, it is safe to say that the United States control 63 per cent. of the refining output of the entire world. Little Galicia produced but 3.36 per cent. of the total world's output of petroleum in 1907, but from all accounts, with that little 3 per cent. of output she has raised an awful stir among the oil circles in Germany and credit is given to her for the cutting of the wax market in Germany quite recently about 30 per cent.

The exporting of petroleum products from the United States has had a most remarkable growth. The total amount exported for the year ended June 30, 1909 (figuring 42 gallons to each barrel) is 32,473,593 barrels, having a total export valuation of $96,750,000. It is interesting to note that during the year 1908, the "panic year," the exporting of petroleum and its products increased over the preceding year 20 per cent., thus demonstrating the wonderful commercial value and stability of the oil business. During the same period the valuation of other domestic products exported, such as breadstuffs, meat and dairy products, hogs, cattle and sheep, declined from 10 to 30 per cent.

In the absence of statistics on the value of the domestic oil trade, I am estimating the domestic values at twice the export values for the year ending June 30, 1909, which would show that the entire refinery output values in the United States for the year amounted to $289,750,000. Who receives this vast amount of money? The refiner, of course; but he cannot keep it; he must buy more oil with which to feed his hungry stills, so the money eventually finds its way back into the pockets of the opulent producer.

The transportation problem to the refiner is of vast importance. Why have refineries valued at millions of dollars been dismantled in Titusville? I will answer by saying that had the railroads given just and equitable rates to the entire refining interests in the past, instead of refineries being dismantled here, Oil Creek valley would be lined with refineries where now there are but three.

In justice to the railroads I want to be put on record as saying that I believe to-day the refiners are getting the squarest deal in freight rates that they have ever experienced. Of course, we do not feel that they are yet on the proper basis of classification, but we must not expect to receive all we ask for at once. During the past 3 years the oil freight rates to at least 60 per cent. of the shipping points have been reduced from 5 to 48 per cent.

In closing, I will say, gentlemen, let the good work go on, and use your every influence to see that not only oil shippers, but the shipper of any commodity, gets a square deal, as the phrase, "A Square Deal" is but the Golden Rule set to "rag time."

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, Sept. 10th, 1909.

The Terrible Catastrophe at Geneva.—A Model Gas Works.—Municipal Amenities.

Naturally the explosion at the gas works belonging to the Municipality at Geneva, Switzeland, has been the principal topic of conversation in gas circles, although very little reliable or official information is yet to hand. The extent of the damage, and the long list of dead and injured, constitute a record. As in no previous instance has a gas works been as damaged as to necessitate laying by for a matter of some weeks before resuming the ordinary operations, nor has there been a casualty list of equal proportions. About 4 P.M. on the 23d ult., an explosion in the purifier house, which reduced the whole structure to a mass of ruins, grounded a large gasholder of nearly 2 million cubic feet capacity and did much damage to buildings in the neighborhood. The works was a modern structure, having been erected about 10 years ago, and the capacity about 400 millions per annum. It was of the character usually understood as "up-to-date," and included a carburetted water gas plant. The building which was destroyed was of a nondescript description, as it also served for many purposes other than that indicated by its title. It comprised a basement for gas pipes and connections, the works' governors, as well as the purifiers, on the ground floor, and offices, laboratory, etc., on the first floor. The combination of governors with purifiers under one roof does not strike one as a desirable arrangement, seeing that the governor house is used nightly and must of necessity be well lighted, nor does a floor above the purifiers appear to be the best position for the offices and laboratory. In fact, the less the weight and strength of the structure immediately above the purifying boxes, the better. It is a singular fact that a large proportion of the explosions that take place on gas works are confined to the purifying house. And when this happens to be a strong and heavy building the disastrous effects are intensified. The Geneva accident supports the view, already established, that strong, massive buildings on a gas works, are not to be regarded as a protection, likely to minimize the effects of an explosion so far as the neighboring property is concerned, but as conducive to the contrary effect. At the time of the occurrence, a new main was in progress, and it is supposed that a valve was left open, causing the escape of a large quantity of gas; but the source from which the gas was fired is mysterious, seeing that the whole works are lighted by electricity. This is not the first ignition that has occurred in a purifier house lighted by electricity, which suggests that glow lamps and electricity conductors can scarcely be regarded in the same category as efficient safety lamps. Thirteen men were killed, the bodies being terribly injured and mutilated, and the list includes one of the engineers of the works, and the resident manager of a meter factory that was also situated on the premises. In addition, a large number received more or less serious injuries. It is hoped that operations may be resumed in a few days, and that some assistance may be received from a neighboring gas works, but meanwhile oil lamps, candles, torches, etc., have been pressed into service as temporary expedients.

A small village gas works just completed at Stanford-le-Hope, in Essex, is an interesting illustration of the fact, now generally recognized, that even in connection with the smallest sized gas plant the best is the cheapest. There is sometimes a tendency to botch up a small works with the aid of second-hand plant rejected from larger works. Instead of placing the design in the hands of a competent engineer, the directors call in a manufacturer of gas appliances, and get the lowest possible price for a complete fit out, or worse still, purchase second-hand apparatus, as advertised, on their own account. They say that the services of an expert are beyond their means, whereas it would be more correct to say that they cannot afford to dispense with such assistance. The result is obvious. Any saving in respect to interest on the outlay is more than counterbalanced by poor working results. The manager of the works, knowing that he cannot by any possibility show respectable working figures, is liable to get negligent, and let things go, with the result that the old-fashioned apparatus has to bear the responsibility for careless working, in addition to its own delinquencies, as it is difficult for a non-professional to discriminate between bad working and bad apparatus. There are certain kinds of apparatus which have not been substantially abused within the last half century, and in respect to that class, the old-fashioned may be as good as the new. But in regard to the greater part of the plant, discarded second-hand stuff is not likely to be of latest or best design. One must remember, too, that some of it has been thrown out on account of inherent defects, or to make room for improved designs, or for reasons other than mere displacement by reason of growth, and that these may not be known to the dealer who buys and sells again, and do not become evident till some time after the apparatus has been fixed and paid for. But at Stanford the apparatus is new and designed on modern lines. The works, which cover much less than an acre, are well situated close to a railway, with facility for a special siding at a future time. There are only two beds of retorts, one setting of one, and one of two, but they are fired on the regenerator principle. A tar column by the side of the hydraulic main allows for the extraction of thick tar as soon as formed and the continuous sealing of the dip pipes in liquor only. There is an exhauster worked by a gas engine, a foul main, tube condenser and Livesey washer, Pride purifiers, and a double lift, spirally guided holder. This kind of apparatus is not usually to be found in a works of this size, but the principal innovation is the distributing plant. Five miles of main have at present been laid, the diameter ranging from 6 to 2 inches, and the whole, including branches, bends, etc., is of Mannesmann steel tube. The same material is also used for service pipes. The mains are supplied in long lengths, 30 feet or

more, thus reducing the labor of jointing, and rigid lead wool joints are used. The advantages of this form of pipe are so well known, as compared with cast pipes, that it would be universally used but for the general supposition that it is not so durable. This prejudice is rapidly disappearing. It can be jointed outside the trench and lowered into place without risk of disturbing the joints, thus avoiding special enlargments of the trench to get room for jointing, and joints made up above ground in full daylight are more likely to be sound all round than those driven in the usual way. A long length can be joined up and sprung to a considerable angle to follow bends in the roads, so there is a marked saving in the matter of special castings. The working results at this model undertaking will be looked for with much interest.

Some time ago a suggestion was made that the Gas Institute should take up a small gas works and equip it for experimental purposes, with a view of deciding various vexed questions in respect to the manufacture and purification of gas, and the addition of a laboratory to such a modern plant as that above instanced would enable tests of coal to be made under working conditions, but with the refinements of laboratory working. Something more could be done in the direction of solving the naphthaline problem. The distributing plant also offers facilities for some inquiry respecting unaccounted-for gas. In addition the plant would be useful for educational purposes.

A difficulty incidental to municipal ownership of gas undertakings has arisen at Salford in connection with the supply of gas to districts outside the borough. It is an established fact that a district within hailing distance of a gas undertaking, substantially larger than itself, can bring gas in bulk, at a fair profit to the makers, for a lower price than they can make it themselves. Suppose, for example, that the consumption in a small township on the outside of a large town or city is likely to be 10 millions per annum. They could buy that quantity, delivered in bulk at the boundary of their district, at 1s. to 1s. 6d. per 1,000 cubic feet cheaper than they could make it at their own works, assuming they acquired one. As they could arrange that their neighbor should undertake the whole supply, it would not be fair to sell to the 10-million district at the same price as that obtaining in the large town, because the distribution costs and loss by leakage are greater in proportion. But the feeling between neighboring authorities, as a rule, is none too cordial. Debatable questions arise between them from time to time, and there is sure to be a certain amount of jealousy. The large township consider that they have acquired the gas works for the benefit of their own ratepayers, who, in theory, are supposed to be supplied with gas at cost price, and they see no reason why they should extend those benefits to their neighbors, by supplying them, without some consideration in the shape of an addition to the current price. The outlying district is apt to question whether it is not paying too much, and objects to contributing in any form towards the enrichment of its neighbor. So it is no unusual thing to find that the suburban district prefers to make its own gas and to be independent of its neighbor, even at a considerable loss. As instancing the feeling that is apt to arise between neighboring townships, I may instance that, on one occasion, H. M. the King was to perform a public ceremony in a district composed of three adjoining towns. One of the three felt aggrieved because the greater part of the route allotted to the royal procession was in the district of its neighbors, and the civic authority in question refused to recognize the event or to take part in the demonstration. The Town Council of Salford find that for some years they have not had a very happy time with the outlying districts, although they have done all in their power to conciliate them. Some are supplied with gas at the ordinary price, others at a trifle more. When the Salford Town Council go to Parliament for additional powers the authorities oppose them with a view of getting some concession. Last year they promoted a bill, and, as a result of the opposition, preferred to withdraw it. Now they have unanimously passed a resolution to the effect that the Gas Committee should be authorized to enter into negotiations with the outlying districts with regard to supply of gas, and, in the event of a reasonable understanding not being attainable, to intimate that the Council will seek relief from the obligation to supply. A conference of the various authorities effected by the resolution is to be held. With the aid of commonsense and good feeling there should be no difficulty in arriving at an arrangement that will be satisfactory and advantageous to all parties concerned.

Nearly all the provincial gas undertakings have now published their reports and statements of accounts for the half year ended June 30, 1909, and in all cases the results show a satisfactory condition. The demand for gas is fully maintained, and in many instances reductions in price are announced. The Bath Gas Company have joined the select few who can claim to sell gas at less than 2s. per 1,000 cubic feet. In not a few cases appreciable additions to the sales of gas are recorded. Auto-meters, free fittings, and maintenance of incandescent burners, are now the usual thing, and with the aid of these departments there is no difficulty in increasing the demand for gas. The use of advertising is much more general, but this is rather in accordance with the spirit of the age than from any pressing necessity to open up new ground in the way of stimulating sales. Gas consumers, like young ladies, now expect to be asked, and if they are not circularized and interviewed, they conclude that the gas company are behind the times. No one appears to know the actual consequences of lapsing into this condition, but there is a general agreement to the effect that it is an awful predicament that must be avoided at any cost. There is reason to believe that the ground is now fairly covered in the matter of auto-meters and that additions are more a matter of natural growth than of taking up previously unoccupied ground. Increases in the adoption of the co-partnership system, with which the name of the late Sir Geo. Livesey will ever be associated, continue to be made. Amongst the latest converts are the gas companies at Westonsupermare, Ilford and Watford. Coke and sulphate sell fairly well, but tar continues to sell at merely nominal prices. Something was expected from its adoption as a dust preventative on public roads, but so far as the accounts are concerned nothing has yet been realized in this direction.

Items of Interest
FROM VARIOUS LOCALITIES.

THE General Construction Company, of Detroit, has been awarded the contract for the complete construction of the new gas plant for Ironwood and Hurley, Mich. The generating apparatus, according to the plans, will be up to putting out 125,000 cubic feet per diem, and the storage holder will be equal to retaining 60,000 cubic feet. Mr. Wm. H. Hulswit, who has been Manager at the Stoughton (Wis.) plant for something over 18 months, will take charge of the local business at Ironwood, and Mr. W. T. Utley, of Detroit, will have charge of the accounts.

"L. S. W.," writing from Troy, N. Y., under date of the 18th inst., inclosed the following: "In its contention that it was out of the question to lay a main on the bed of the river between Troy and Waterford, the Troy Gas Company was sustained by the up State Public Service Commission at the hearing held this week. The hearing was the result of complaints by the citizens of Waterford, whose representatives insisted that the Company should be compelled to make permanent connection at Waterford on the bed of the river. Mr. Henry C. Shields, Superintendent of the Company, said his Company would gladly seize the opportunity to lay such a main to supply Waterford if the barge canal question were out of the way; but until the canal proposition was cleared away, he said, a permanent line as desired could not be laid. The Company, however, would undertake to furnish temporary wiring for the Waterford churches, which are now without lights, and Mr. Shields is to obtain from the Bridge Company the best possible assurance as to the time when the new bridge will be ready for the mains and submit his statement to the Commission, which has granted the complainants leave to file additional statements as to the practicability of carrying permanent mains under the water."

SUPERINTENDENT FOX has prepared a schedule for notable main extensions through the streets of Springfield, Mo. The arrangement calls for the placing of not less than 5 miles of pipes, no diameter thereof to be less than 4 inches.

WE are indebted to the courtesy of Mr. L. F. Gray for the following: "The Fifth Annual Report of the Norwich (Conn.) Gas and Electric Commissioners shows that the department is still being operated at a profit, although there is some decrease from the profit shown last year. Undoubtedly the decrease is due to a reduction in the rates for electric current, and to putting the salary of the Superintendent on plane something like commensurate with the value and importance of the duties of his onerous position. However, the full benefit of the low price for electric current from the Uncas Power Company has not been fully felt as yet, for the steam plant was run much of the time this summer, and many repairs had to be made, all of which added to the capital charge. In another year, however, the municipality will be receiving much benefit from the continuous working of the installation. The statement which shows that there is over $100,000 in the bank drawing interest, which sum is altogether credited to reserve funds from net profit, indicates that there will be something to pay off the indebtedness within a few years. The report recommends that further improvements be made at the steam plant in order to carry the increasing load should the Power Company fail. An interesting statement in the report is that of the city treasurer, who states that he has received since 1904 $68,247.16 in excess of the amount he has paid out for the department. There was an increase in sales of electricity but a decrease in gas, the profit on the former

dropping about $4,000 and that on the gas about $3,000, but as the plant is limited to a certain per cent. of profit the reduction in price was made and for that reason the profit would show a falling off. However, in the drop the cost of the street lights shows a reduction from last year when arc lights, taxed to the city at cost, were figured at $78.53, while the year just finished the cost was but $76.59. There was also a drop in the cost of incandescent lights from $13.90 each to $12.26, and this will probably show a further drop the coming year. Less money has been expended for additions to the plant this year than ever before, only about $21,000 being used, while last year over $30,000 was spent, in 1907, there was $42,000 spent and in 1906 the sum spent amounted to $79,000."

THE latest dividend in the shares of the Public Service Corporation of New Jersey is at the rate of 1¼ per cent. for the quarter, thus putting the shares on a 5 per cent. basis.

"G. W. S." is informed that the annual meeting of the Massachusetts Companies is set for the 12th prox.

MAYOR BELL, of Port Huron, Mich., paid his gas bill last month at the rate made by the Gas Company. Of course, he paid it under protest; but he paid it, nevertheless.

THE Marquette County (Mich.) Gas and Electric Company has completed the job of installing the gas burner outfit in the domestic service department of the new High School structure. The laboratory of the High School is also being equipped with gas burners, after which the carpenter shop in the manual training department will be similarly outfitted.

THE gas and electric lighting plants heretofore operated by the Monmouth (Ills.) Gas Company have passed into the control of the Monmouth Public Service Company. The executive management of the succeeding corporation is thus composed: President, N. H. Schotte, Chicago; Vice-President, F. W. Harding; Secretary, J. W. Clendenin; Treasurer, W. D. Brenton. Builders of works apparatus might take note that the new owners contemplate many changes and betterments.

MAYOR CLAYTON, of St. Joseph, Mo., has again taken up the matter of requiring the St. Joseph Gas Company to extend its mains to and through the adjoining settlement of Brookdale.

THE gas engine pumping plant at Sisterville (W. Va.) water works is being enlarged by the addition of a 100-horse power vertical Westinghouse gas engine, driving a triplex pump through a friction-clutch. Natural gas is used, having a fuel value of approximately 1,000 B.T.U. per cubic foot, and costing 15 cents per 1,000 cubic feet. The existing pumping equipment of this station comprised an 85-horse power Westinghouse, vertical engine, and the economy in using gas engine power having been found so pronounced, an extension of this type of machine has been fully warranted.

ON the first prox. the rate charged for gas by the Wilkes-Barre (Pa.) Gas and Electric Company will be $1.10 per 1,000, gross. Prompt payment makes operative a discount of 10 cents per 1,000. When the monthly consumption shows in excess of $50 value, the net rate will be 90 cents per 1,000.

ACCORDING to the report filed by Mr. W. M. Russell, Gas and Water Inspector for Dallas, Tex., respecting the work done in that division for the month of August, the average heating value of the gas supplied was equal to 654 B.T.U., which is the maximum average value for any month since the doing of this work on municipal account. On complaint 6 gas meters were tested, 3 of which were fast (maximum 3.6 per cent.), 2 were slow (maximum variation, 12.1 per cent.) and 1 was correct.

THE largest corporation tax paid in Lynn, Mass., this year is the Lynn Gas and Electric Light Company, which sent to the City Treasurer, on taxation account, the big sum of $40,146.10. Last year the Company paid on like account, $33,185.94.

MR. WALTER E. DUBARD, formerly a clerk in the sales' office of the Detroit City Gas Company, has accepted a position with the B. C. Whitney Operatic Company. He is billed for an engagement that will cover several months, the starting measure being "Knight for a Day."

THE Anderson Gas Company, for Anderson, S. C., has petitioned for a working franchise. Mr. George A. Thompson, of Spartanburg, is said to be largely concerned in the venture.

On the occasion of taking the joint testimony, in the matter of the prayer of the proprietors of the Plymouth County (Mass.) Gas and Power Company, Mr. P. A. Nevins, President, for the right to issue $1,000,000 original stock, no opposition was made by the Board of Gas and Electric Light Commissioners. The hearing was, however, adjourned to the 27th inst.

THE proprietors of the Jacksonville (Fla.) Gas Company last week filed information with the proper authority that at a special meeting of the shareholders, held July 26, 1909, it was voted to amend the charter, permitting a stock issuance thereunder to $2,000,000, on capital account.

MR. LESLIE B. MILLER, Cashier for many years to and for the Bangor (Me.) Gas Light Company, has accepted the position of Assistant Manager to the Burlington (Vt.) Gas and Electric Company.

THE H. W. Johns-Manville Company has extended an invitation to those in attendance at the meeting of the Illuminating Engineering Society to make its offices (100 William street) their headquarters.

WE are indebted to the courtesy of Mr. Townsend Stites, General Manager of the Welsbach Company, for a copy of its latest publication, titled the "Reflexolier Booklet." It is certainly a well-gotten up-bit of literature, and its clear text and profuse picturings make perfectly plain the purpose for which it was arranged. Write to Manager Stites for a copy, at his address in Gloucester, N. J.

MR. L. GASTER, Hon. Secy. to the London (England) Section of the Illuminating Engineering Society, informs us that Prof. Sylvanus P. Thompson, D.Sc., F.R.S., has consented to become the first President of the Society, which is all to the good in respect of making a forecast of its future growth and position.

MR. MORGAN MORGANS has succeeded Mr. A. B. Eilbeck as Manager of the Childs-Hulswit lighting properties at Chattanooga, Tenn. Mr. Eilbeck, as before noted in the JOURNAL, returns to New York to assume an important position with the Henry L. Doherty interests. The day prior to his going from Chattanooga, at the invitation of Mr. R. W. Harbor, Secretary of the Company, Mr. Eilbeck joined a large group of the Company's forces, whom he presumed had gathered for the purpose of bidding him goodbye. The presumption was true, but the farewell was accompanied by the presentation to him of a handsome walrus-leather traveling bag and a speech, the sentiment of which certainly went to show that the retiring Manager stood well in the minds of his men.

AT the annual meeting of the Worcester (Mass.) Gas Light Company, the following officers were chosen: Directors, Charles D. Lamson, Thomas B. Eaton, Samuel B. Woodward, Albert Wood, Francis H. Dewey and A. G. Bullock; President, Charles D. Lamson.

THE operation of the Middleboro (Mass.) Gas Light Company (it is a municipal plant) during the year ended July 14th, 1909, was carried out at a profit of $362. This is the first time in many years that such a story can be related. Last year, for instance, the loss was $1,290.

HAVING served 33 years continuously on the staff of the Wilmington (Del.) Gas and Electric Company, well over half of which period in the dual position of Secretary and Treasurer, Mr. W. P. Taylor has resigned from its services. As we understand it, he has been transferred to the home offices of the Geist syndicate. He certainly did his best for the Betts interest, which controlled the Wilmington artificial lighting situation for a very long period.

THE gas and electric plants of the El Reno (Okla.) Gas and Electric Company have been purchased by the H. M. Byllesby Co., of Chicago. The new owners will expend a large sum in betterments.

THE Commercial Gas Company, to maintain and operate a gas works in and about Port Norris, N. J., has been incorporated by Messrs. John W. Barry, H. E. Hanson and R. L. Sharp.

THE new proprietors of the Belfast (Me.) Gas and Electric Company, who are also the controllers of the Penobscot Bay Electric Company, deny the report that the gas works is to be shut down. To the contrary, the plant will be overhauled and a vigorous attempt will be made to put it in shape that will cause it to become the recipient of thanks rather than receiver of kicks, which latter were freely passed to it during the past 5 years or so.

The Market for Gas Securities.

The first positive indication that the long expected upward movement in Consolidated was at hand, is reflected in the current quotations for that stock. It opened to-day (Friday) at 148 to 148½, and the outlook was that it would reach 150 before adjournment this afternoon. Talk again is heard of a union of the Brooklyn Union and Consolidated Companies, and a supporting straw for the theory is the closeness of quotations of the respective shares.

Brooklyn Union is 147½ to 148½, ex-div., and Peoples, of Chicago, looks very low at 115½. Washington (D. C.) gas is 387 to 390. It is a purchase at this price. A prominent financier in Washington declared to the writer early this week, that Washington gas should sell at 425 before Thanksgiving.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

SEPTEMBER 27.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies,	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$73,177,000	100	148	148 ¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	147½	148¼
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,550	509	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1½	1¼
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	509,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,000,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,028,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	881,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	104	105
Preferred	2,500,000	100	—	98
Bonds	10,000,000	1,000	104	—
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	67	67¾
Preferred	25,000,000	100	92½	93
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	115¼	115¾
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

GAS ENGINEERS.

Bartlett-Hayward Co., Baltimore, Md. 801
Cruse-Kemper Co., Philadelphia, Pa. 788
Davis & Farnum Mfg. Co., Waltham, Mass. 800
Economical Gas Apparatus Construc. Co., Toronto, Ont. 778
Evens & Howard Firebrick Co., St. Louis, Mo. 790
Frank D. Moses, Trenton, N. J. 782
Frederick J. Mayer, New York City. 781
Henry I. Lea, Chicago, Ills. 800
H. M. Byllesby & Co., Chicago, Ills. 800
Humphreys & Glasgow, New York City. 800
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Davis & Farnum Mfg. Co., Waltham, Mass. 800
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The United Gas Improvement Co., Philadelphia, Pa. 795
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George Light, Dayton, O. 799
H. Mueller Manufacturing Co., Decatur, Ills. 782

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Perkins & Co., New York City. 798

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The Stacey Mfg. Co., Cincinnati, O..... 803
Western Gas Construction Co., Fort Wayne, Ind..... 808

(*Continued on page 778.*)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 8, 1909.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1909, to stockholders of record at the close of business, Sept. 30, 1909. Checks will be mailed.

1788-5 LEWIS LILLIE, Treasurer.

WANTED,

A Position as Manager or Superintendent

Of a coal or water gas plant, or combined plant. Am getting the best of results at present place of employment. Have excellent recommendations. Address, "F. J. R,"

1787-4 Care this Journal.

Position Wanted

By ambitious young man in plant manufacturing coal and water gas. Wants to learn business. At present employed as distribution superintendent of high and low pressure systems. Has 8 years' general experience in gas business in large town.

Address, "I. S.,"

1783-2 Care this Journal.

WANTED,

A Position as Foreman of Shop or Street, or to Take Entire Charge of the Distribution.

I am a young married man, strictly sober and industrious, and a first-class workman. Experienced on both high and low paessure water and coal gas. First-class references and r commends. Will go anywhere. Address, "1777,"

1789-2 Care this Journal.

Position Wanted

As Engineer or Superintendent of a Gas Company.

Good technical training and broad experience in manufacture and distribution of coal and water gas.

Address, "L. E. S.,"

1790-1 Care this Journal.

WANTED,

A Man who is Capable of Taking Full Charge of a Gas Plant

In a small town in New York State, making water gas. Must understand the manufacturing thoroughly. State qualifications and salary expected.

1790-1 Address, "J. D.," care this Journal.

Solicitor Wanted.

Hustling and competent natural gas solicitor, familiar with domestic, industrial and boiler work. Good place in Central West for good man only. Give testimonials, experience and required salary.

Address, "UNION,"

1790-2 Care this Journal.

FOR SALE,

WATER GAS PLANT

In town of 8,500. Address all correspondence to "LOCK BOX 21,"

1790-2 BROOKLYN, IOWA.

FOR SALE.

ONE SET OF "KING'S TREATISE ON COAL GAS,"

Three volumes. Edition 1882. Price, $100.

Address,
AMERICAN GAS LIGHT JOURNAL,
42 PINE STREET, NEW YORK CITY.

FOR SALE,

One set of 4 purifying boxes 12 feet 8 inches by 10 feet 9 inches by 3 feet, in good condition, with centerseal and 10-inch connections. Also one American 8-foot station meter.

1771-tf YORK GAS CO., York, Pa.

FOR SALE,

Two (2) No. 3 Rotary Station Meters.

Capacity, 500 to 5,000 cubic feet per hour. Meters have never been in use, owing to change in works. Will dispose of at a bargain.

KELSEY, BREWER & CO.,

1788-3 Grand Rapids, Mich.

FOR SALE.

GAS HOUSE EQUIPMENT AND METERS.

Bench Room consists of two pit and one surface bench of 6's, one cold air condenser; one 40-horse power marine boiler.

Scrubber and Condensing Room, two scrubbers, size 20 by 3½.

One Water Condenser, size 20 by 3½.

One Ammonia Extractor, one Tar Extractor, one Exhauster, capacity 250,000 feet.

One-Horse Power Vertical Steam Engine.

One Center Seal, two Purifying Boxes, size 14 by 14 feet, one Station Meter, D. McDonald & Co., Albany, N. Y.

One Station Governor.

List of Gas Meters.

Keystone.	*Harris & Griffin.*	*Standard.*	*American.*
6 5-light	10 5-light.	2 5-light.	37 3-light.
7 3-light.	1 10-light.	7 3-light.	41 5-light.
1 10-light.	20 3-light.	—	2 20-light.

McDonald.	*John Griffin.*	*Harris Bros.*
21 3-light.	35 3-light.	42 3-light.
1 10-light.	3 5-light.	7 5-light.
3 5-light.	2 45-light.	—
2 100-light.	2 10-light.	—

One Telescope Gasholder, 2-lift, capacity 125,000 cubic feet.

Having discontinued the gas business on account of natural gas being piped into this city, the above named property is offered for sale by the

CITIZENS LIGHT AND POWER CO.,

1780-2 Xenia, Ohio.

FOR SALE.

One Primary Air Condenser, 20 feet high, 4 feet 6 inches diameter, 12-inch connections.
One Secondary Air or Water Condenser, 20 feet high, 4 feet diameter, 10-inch connections.
One Secondary Water Condenser, 15 feet high, 3 feet, 6 inches diameter, 10-inch connections.
Two Scrubbers, each 4 feet diameter, 10-inch connections.
One Scrubber, 3 feet diameter, 12-inch connections.
One 8-Inch Roots Exhauster, with 3 by 4½ Upright Engine, direct connected.
Four 10 by 10 by 3-Foot Lime Purifying Boxes, with 12-inch connections.
One Smith-Vaile No. 2 Pump.
One Davidson 4½ by 2½ by 6-Inch Pump.
One American Meter Company Station Meter, 5 feet 6 inches by 5 feet 6 inches.
One American Meter Company Station Meter, 3 feet 6 inches by 3 feet 3 inches.
One Cast Iron Hydraulic Main, 10 feet long.
One Wrought Iron Hydraulic Main, 12 feet long.
One Wrought Iron Hydraulic Main, 21 feet 6 inches long.
Ironwork for 4 benches of 6's.
One 12-Inch Connolly Street Main Pressure Governor, with by-pass valves.
One No. 10 P. & A. Tar Extractor.
One 3-Foot U. G. I. Water Gas Set, complete.
3,500 Bushels of Oxide.

All of the above in close proximity to Kansas City and in first-class condition. Address, "NATURAL GAS,"

1787-4 Care this Journal.

(Concluded from page 777.)

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 797
F. Behrend, New York City 778
The United Gas Improvement Co., Philadelphia, Pa. 795

EXHAUSTERS.

Connelly Iron Sponge & Governor Co., New York City 797
Connersville Blower Company, Connersville, Ind. 804
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Isbell-Porter Company, Newark, N. J. 788
Kerr Murray Mfg. Co., Fort Wayne, Ind. 801
Piqua Blower Co., Piqua, O. 789
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HIGH PRESSURE GAS GOODS.

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PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills. 783

GAS PLANT TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills. 783

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HOT WATER HEATERS.

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GASHOLDERS.

Bartlett-Hayward Co., Baltimore, Md. 801
Continental Iron Works, Brooklyn, N. Y. 798
Cruse-Kemper Co., Philadelphia, Pa. 788
Davis & Farnum Mfg. Co., Waltham, Mass. 800
Deily & Fowler Mfg. Co., Philadelphia, Pa. 804
Economical Gas Apparatus Construc. Co., Toronto, Ont. 778
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R. D. Wood & Co., Philadelphia, Pa. 802
Riter-Conley Mfg. Co., Pittsburgh, Pa. 787
The Stacey Mfg. Co., Cincinnati, O. 803
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STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md. 801
Davis & Farnum Mfg. Co., Waltham, Mass. 800
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LEATHER BELTING.

Chas. A. Schieren Co., New York City. 784

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Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 100 in use. Write to

STROH & OSIUS, Patentees, or

MICHIGAN AMMONIA WORKS, - Detroit, Mich.

WILLIAM A. BAEHR,

CONSULTING ENGINEER,

Commercial National Bank Building,

CHICAGO.

Also Representing

The Bartlett-Hayward Company.

Celebrated Lux Gas Purifying Mass

Will Save 50 Per Cent. Labor.

Used in the Gas Works of Berlin, Kiel, Frankfort, Vienna, Amsterdam, Antwerp, London, Edinburgh, Copenhagen, Madrid, Seville, Barcelona, Rio de Janeiro and others. :: :: ::

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54 Front St., New York.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, LIMITED,

Consulting Engineers.

Builders of UP-TO-DATE Machinery and Appliances for Coal and Water Gas Plants. :: :: :: :: ::

PLANS, SPECIFICATIONS AND ESTIMATES PREPARED.

AMERICAN OFFICE:

269 Front St., East, Toronto, Canada.

LLOYD CONSTRUCTION COMPANY

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DETROIT—MICHIGAN

"THE MINER"

GLOBE STREET LAMPS.

OVER FORTY YEARS IN USE THE WORLD OVER.

THE BEST STREET LAMPS for ALL KINDS OF GAS OR BURNERS.

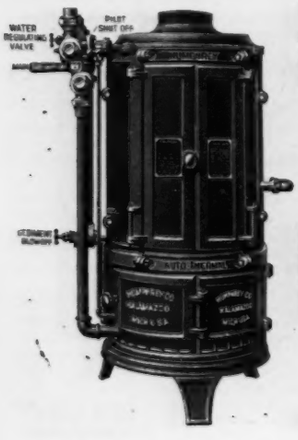
This is only one of a Large Variety of Styles.

SEND FOR CATALOGUE.

THOS. T. W. MINER,

821 and 823 Eagle Avenue, New York.

NO. 100 LAMP.



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Have every known desirable feature helping to efficiency, economy, durability and absolute safety.

FULLY GUARANTEED.
PRICES LOW.
QUALITY AND SERVICE HIGH.

Will you help us sell them?

HUMPHREY CO.,

Kalamazoo, Mich., U. S. A.

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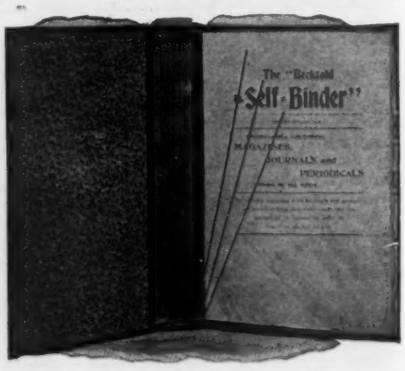
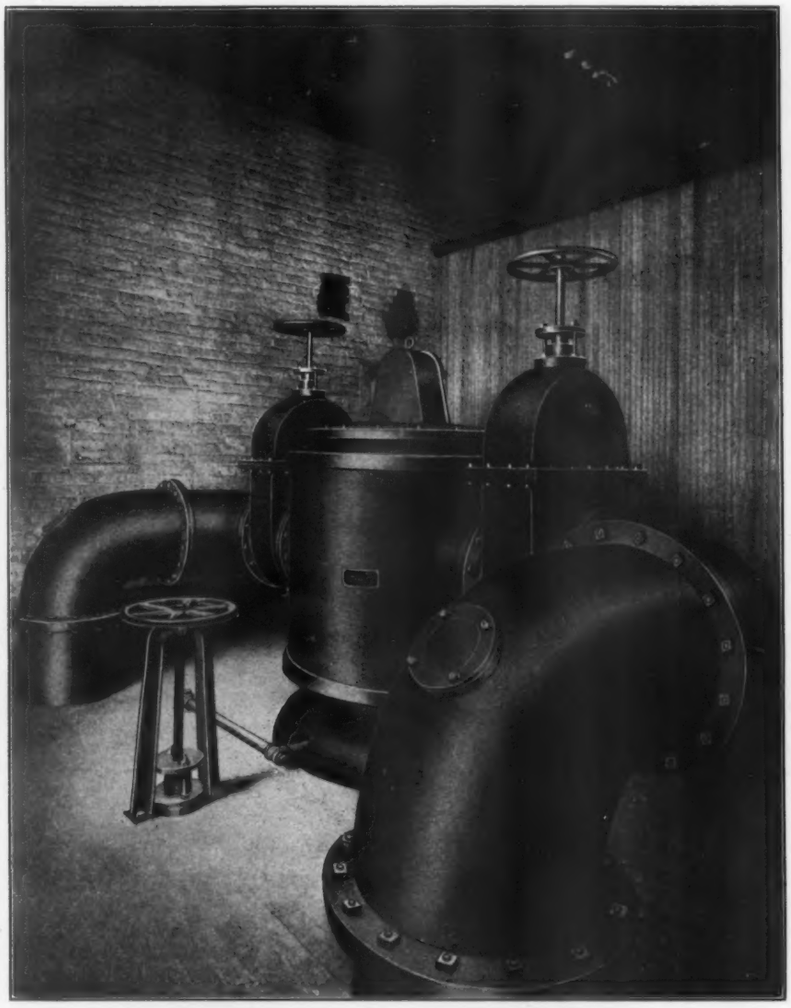
PRICE, **$1.**



FOR SALE BY AMERICAN GAS LIGHT JOURNAL 42 Pine St., New York City.



View Meter Room, Richmond (Va.) City Gas Works
Rotary Meter, 85,000 cu. ft. per hour, Delivered July, 1908.

W. P. Knowles, Superintendent and Engineer of the above Company, writing us under date July 17, 1909, says:

"The Rotary Meter has worked satisfactorily up to this time, with which I am very much pleased."

ROTARY METER COMPANY

One-half the Cost—One-tenth the Space of Old Style Wet Meters.

When in Need of Station Meters Write

ROTARY METER COMPANY,

280 BROADWAY,

NEW YORK.

OUR LITERATURE WILL BE SENT ON REQUEST.

P. PLANTINGA, President W. E. STEINWEDELL, Secretary

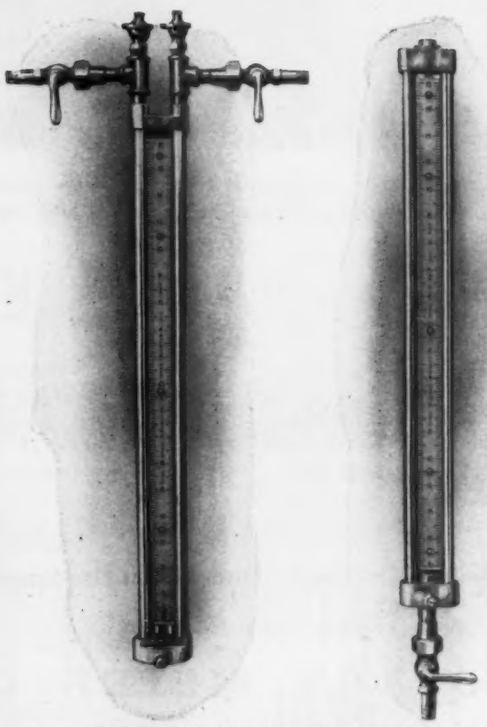
THE GAS MACHINERY CO.,

Main Office and Shops

CLEVELAND, OHIO.

NEW YORK OFFICE, - - 56 PINE STREET.

COAL AND WATER GAS APPARATUS,
EXHAUSTERS, CONDENSERS, SCRUBBERS,
TAR EXTRACTORS, WASHERS, PURIFIERS,
VALVES, CONNECTIONS,
BY PRODUCT MACHINERY,
COMPLETE GAS PLANTS.



DIFFERENTIAL AND OPEN PRESSURE GAUGES.

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Hudson Terminal Building,

WORKS:
Keasbey, Perth Amboy, N. J.

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"The Only System in Successful Operation."

U. S. Patent No. 904043.
"Process Patent for the Carbonization of Coal in Vertical Retorts."

U. S. Patent No. 801268.
"Operating Mechanism for Bottom Mouthpieces."

U. S. Patent No. 906187.
"Feeding Device."

U. S. Patent No. 899503.
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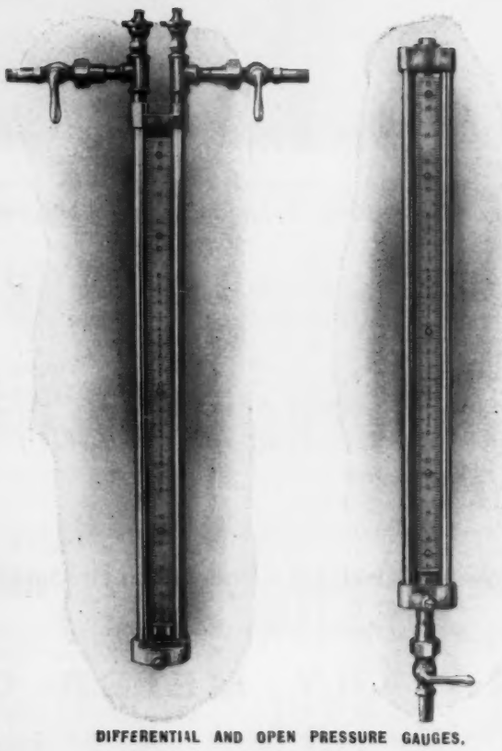

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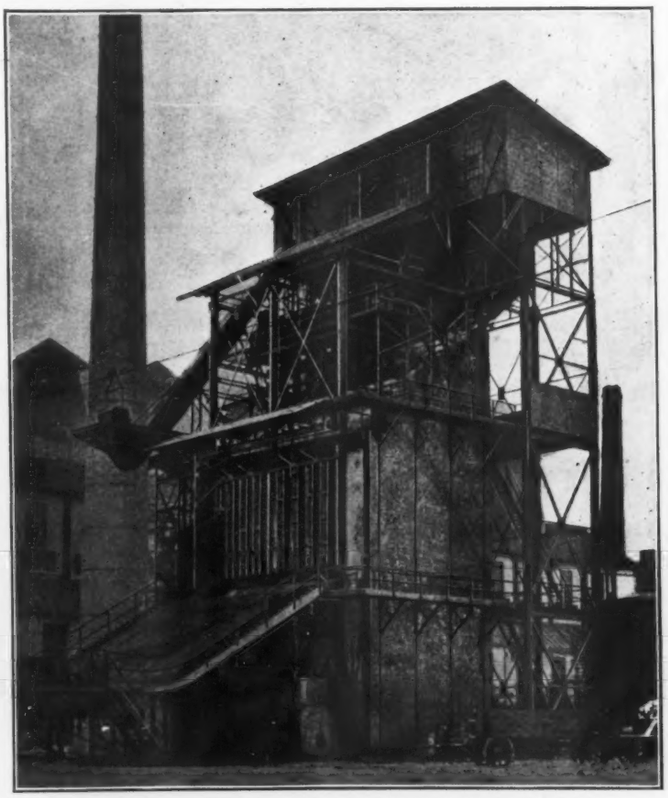
Do You Know About Chamber Ovens?

Horizontal, Vertical, or Inclined.



If your output is over 250,000 feet per diem don't fail to consult

THE CHAMBER OVEN CO.,

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FRED. BREDEL, President.

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Incline Chamber Oven with four chambers each. Capacity, 275,000 cubic feet per oven.

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Don't send out their product until after it has been tested and proved to be correct. Knowing this to a certainty they can confidently make and sustain certain claims.

There is no similarity between such watches and Mueller Gas Tapping Machines, but our policy is like that of the watchmaker in that the parts of each tapping machine are carefully inspected, the tool lined with the feed screw and the machine thoroughly tested for manipulation.

No 16 Mueller Gas Tapping Machine (Patented).

The No. 16 machine illustrated here makes taps ⅜ to 2-inch in all sizes of pipe under pressure. The swiveled goose neck enables the operator to turn it around to the most advantageous position.

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If you're not on our free list for "The Belt Book" periodical let us have your name and address and we'll send it.

Chas. A. Schieren Company

ESTABLISHED 1868

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CHICAGO, 84-86-88 Franklin St.
BOSTON, 641 & 643 Atlantic Ave. (Opposite South Station).
PHILADELPHIA, 226 North 3d St.
PITTSBURG, 205 Wood St.
DENVER, 1732 Arapahoe St.
BROOKLYN, N. Y., Cor. 13th St. and 3d Ave.
HAMBURG, GERMANY, Auf dem Sande 1.
OAK LEATHER TANNERIES, Bristol, Tenn.

THE HUMPHREY

GAS ARC LAMP,

Designed, Developed and Distinguished as

"The Gas Company's Lamp,"

Has been one of the most conspicuous successes of the past decade in lighting lines. The competing lamps that were brought out in scores during the earlier days had but a brief life and exist to-day principally as unpleasant memories of ill-considered purchases. **Is not the same thing about to be repeated with Inverted Gas Arc Lamps?**

Adopt the **Humphrey Inverted** as your standard and be insured and protected by the strongest, most liberal and progressive gas lighting organization in the world.

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London, England. **Bremen, Germany.** **Wellington, New Zealand.**

Whether you buy Ironclads or not, you owe it to yourself to investigate them.

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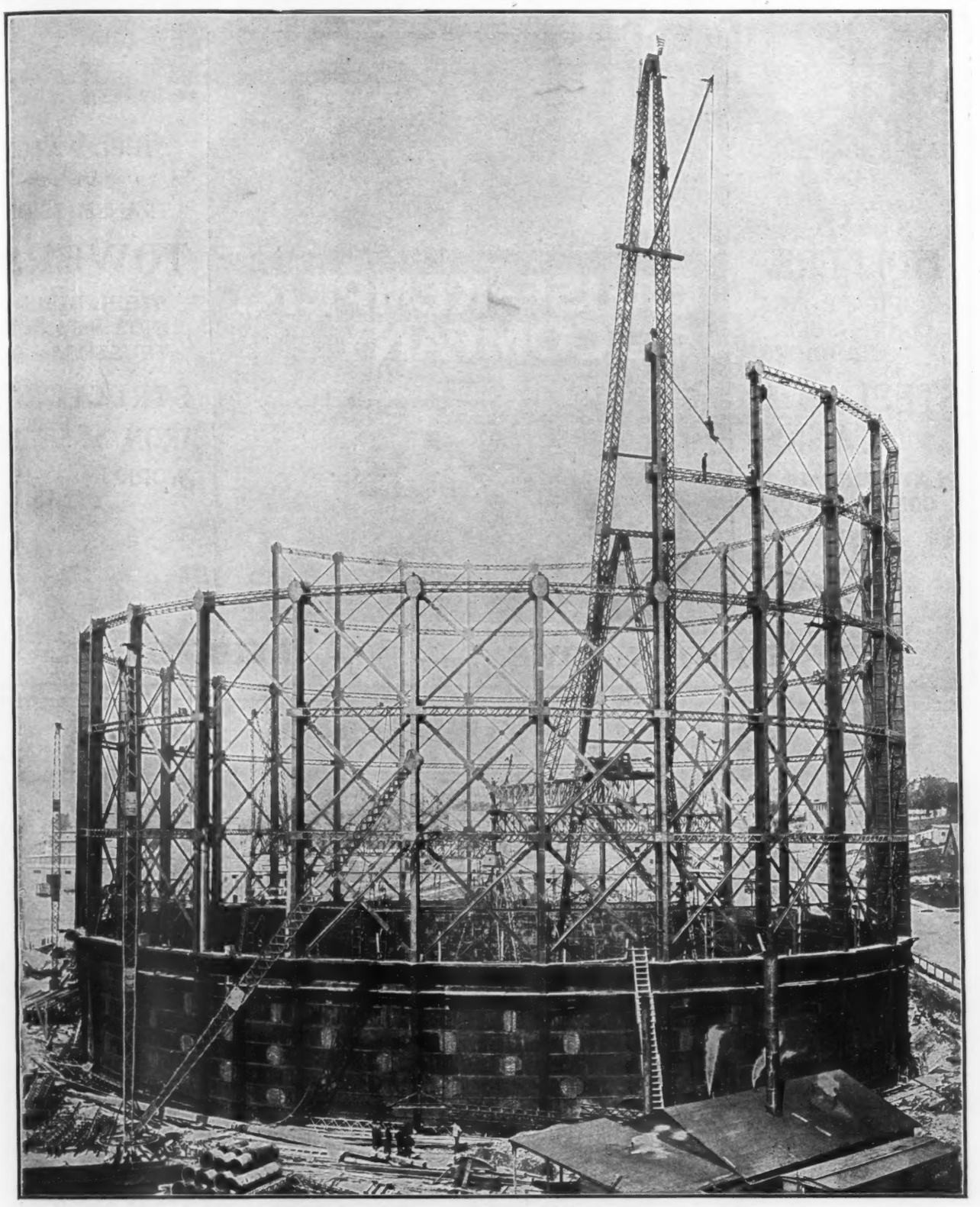

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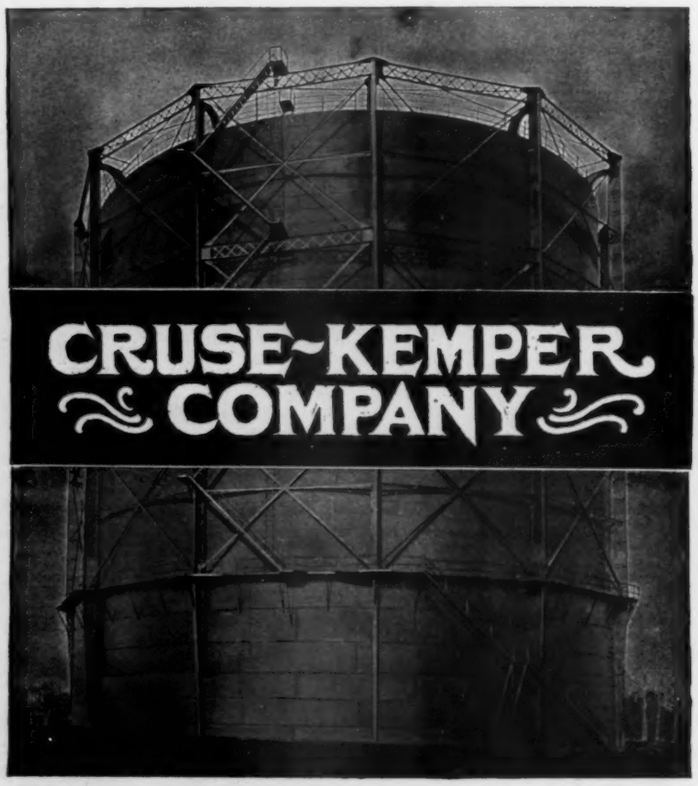

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STEEL BUILDINGS and ROOF TRUSSES.
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PRIMARY AND SECONDARY CONDENSERS FOR FRESH OR SALT WATER

ISBELL VALVES SPECIALS
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We have a full line of sizes for all standard pressures. The design, material and workmanship is A-1. Prompt Delivery and Reasonable Prices. WHY NOT give us YOUR requirements?

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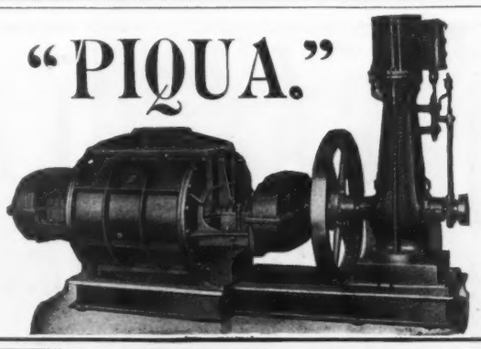

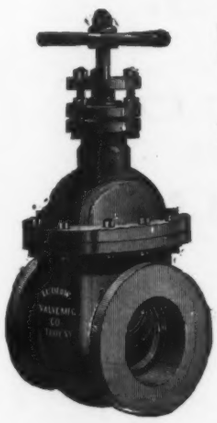

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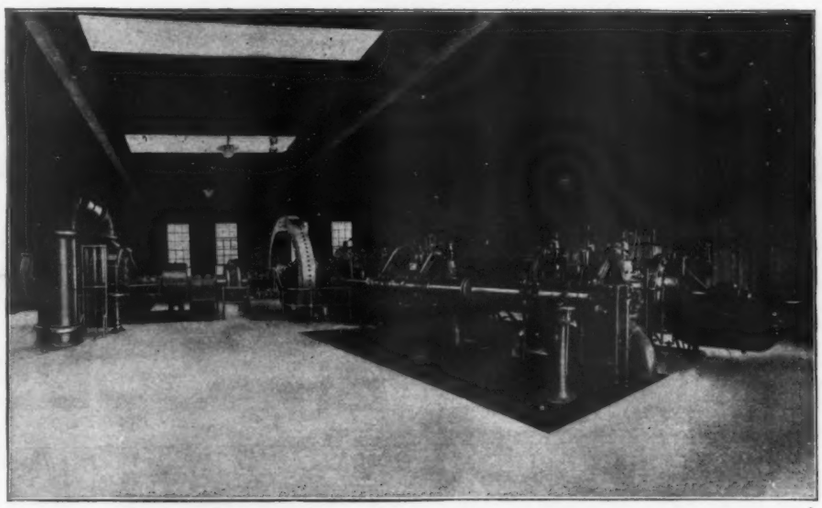
A half century of experience, up-to-date engineering and shop facilities embodied in these **World Famous Gas Exhausters.**



An Installation for the Peoples Gas Light and Coke Co,, Chicago, Ill., handling 1,000,000 c , ft. per hour, under six (6) pounds per square inch.

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Gas Retort Benches.
Longest life—largest output per retort—lowest fuel results—greatest ease of operation.
Water Gas Linings.
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Large stock of retorts and settings on hand.
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The "Gas World" Analyses of Municipal Gas Accounts, FOR 1907-1908,

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The former showing at a glance 69 accounts and the latter 55 accounts of Coal and Water Gas Companies, itemized under

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NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

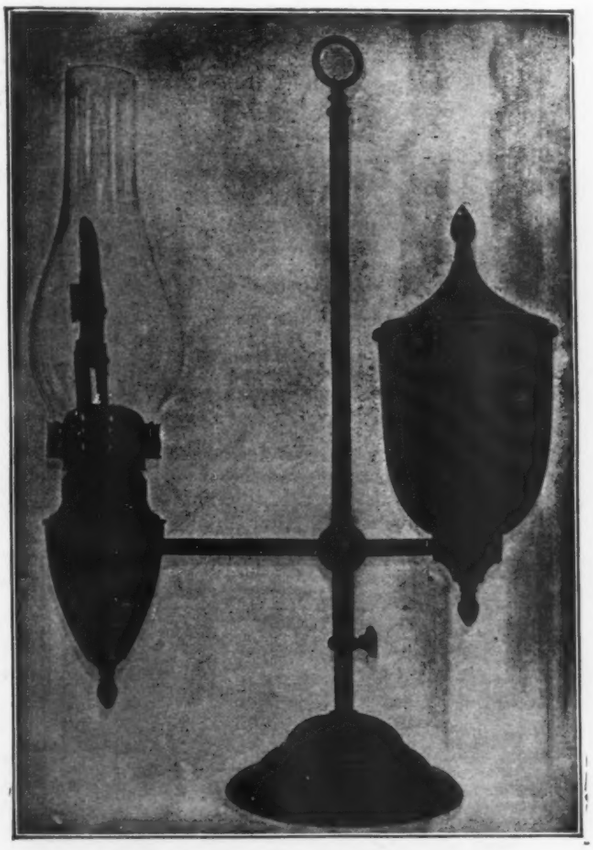
OCTOBER, 1909.

Day of Week.	Date.	Table No. 1. FOLLOWING THE MOON. Light.	Extinguish.
Fri.	1	6.10PM	8.20PM
Sat.	2	6.10	8.50
Sun.	3	6.10	9.30
Mon.	4	6.10	10.20
Tue.	5	6.10LQ	11.10
Wed.	6	6.10	12.10AM
Thu.	7	6.10	1.10
Fri.	8	6.10	2.20
Sat.	9	6.10	3.20
Sun.	10	6.00	5.10
Mon.	11	6.00	5.10
Tue.	12	6.00	5.10
Wed.	13	6.00NM	5.10
Thu.	14	6.00	5.10
Fri.	15	6.00	5.10
Sat.	16	6.00	5.10
Sun.	17	5.50	5.20
Mon.	18	6.50	5.20
Tue.	19	7.30	5.20
Wed.	20	8.20	5.20
Thu.	21	9.20LQ	5.20
Fri.	22	10.30	5.20
Sat.	23	11.40	5.20
Sun.	24	1.00AM	5.20
Mon.	25	2.10	5.20
Tue.	26	3.30	5.20
Wed.	27	No L.	No L.
Thu.	28	No L.FM	No L.
Fri.	29	No L.	No L.
Sat.	30	5.30PM	7.20PM
Sun.	31	5.30	8.10

TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30



THE ELLIOTT KEROSENE STANDARD PHOTOMETER LAMP.

***

10-Candle Power.

***

This lamp is a perfect substitute for the 10-candle Pentane Lamp hitherto used, and has the following advantages:

1st. It uses Standard Kerosene Oil (Pratt's Astral Oil or equivalent).

2d. It is remarkably steady. Will burn 24 hours continuously with less than 2 per cent. variation.

3d. It is much less dangerous than Pentane, which is a kind of gasolene.

4th. It is not easily affected by air currents in the photometer room.

5th. Since the lamp may burn continuously, the candle power of gas may be taken at any moment, if necessary. This insures steady illuminating power without waste of carburetting material.

6th. The first cost of the lamp brings it within the reach of even small gas works.

7th. Costs much less to maintain than a Pentane lamp or sperm candles doing the same service.

8th. Is not affected by the weather.

PUBLIC LIGHTING TABLE.

OCTOBER, 1909.

Day of Week.	Date.	Table No. 2. NEW YORK CITY. All Night Lighting. Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A.M.
Fri.	1	5.22	4.42
Sat.	2	5.22	4.42
Sun.	3	5.22	4.42
Mon.	4	5.22	4.42
Tue.	5	5.22	4.42
Wed.	6	5.22	4.42
Thu.	7	5.22	4.42
Fri.	8	5.12	4.52
Sat.	9	5.12	4.52
Sun.	10	5.12	4.52
Mon.	11	5.12	4.52
Tue.	12	5.12	4.52
Wed.	13	5.07	4.52
Thu.	14	5.07	4.52
Fri.	15	4.57	5.02
Sat.	16	4.57	5.02
Sun.	17	4.57	5.02
Mon.	18	4.57	5.02
Tue.	19	4.57	5.02
Wed.	20	4.57	5.02
Thu.	21	4.57	5.02
Fri.	22	4.47	5.07
Sat.	23	4.47	5.07
Sun.	24	4.47	5.07
Mon.	25	4.47	5.07
Tue.	26	4.47	5.07
Wed.	27	4.47	5.07
Thu.	28	4.47	5.07
Fri.	29	4.37	5.17
Sat.	30	4.37	5.17
Sun.	31	4.37	5.17

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
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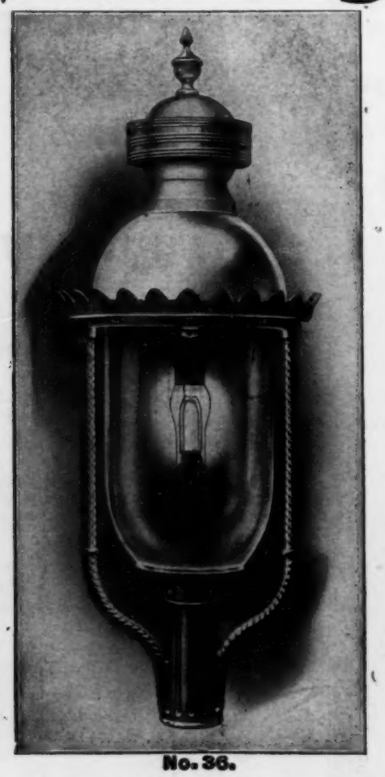
WELSBACH STREET LIGHTING COMPANY



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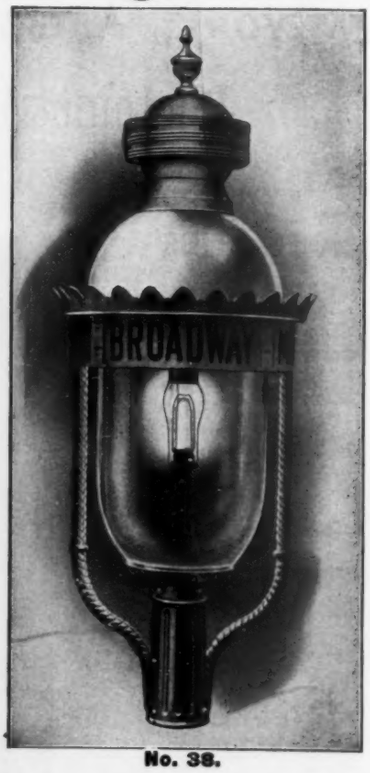

No. 38.

Welsbach Inverted Portico Lamps

No. 901. INVERTED PORTICO LAMP.
Single Burner.

For all semi-exposed places—porticos, entrances, etc. simple in construction, few parts; exterior made of enameled steel, interior parts of heat-resisting material that are practically indestructible. Wind, storm and insect proof.

The globes on designs No. 901 and No. 902 are supported in a flanged reflector that provides for heat expansion. The reflector being hinged, it can readily be lowered for cleaning or trimming the lamp.

Gas and pilot-flame adjustment by means of needle valves from outside of lamp. The pilot-flame is protected and will not blow out.

Three Styles from which to Choose:

No. 902.

Equipped with No. 5 clear globe and steel enameled reflector 8⅜ inches in diameter and 1½ inches deep. Finish, dark green enamel.

Dimensions: Length over all, 16 inches; diameter of globe, 5 inches; depth of globe, 4 inches. List price, complete, without mantles... $8.00

No. 900.

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White and gold enamel. List price, without mantles..... $9.00

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No. 901.

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List price, complete, without mantles.. ..... $3.00

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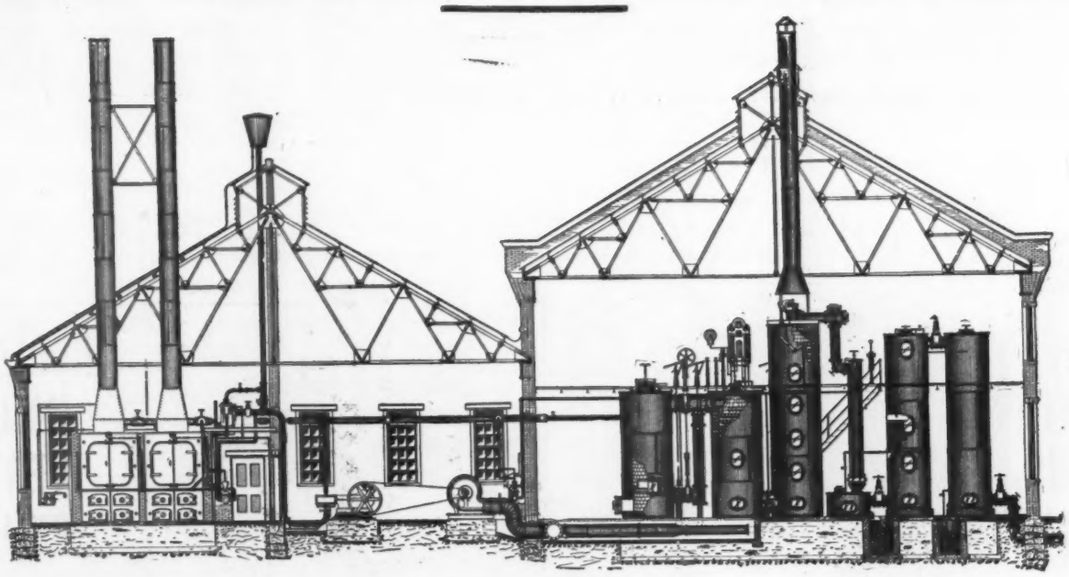

TOTAL SETS INSTALLED TO JULY 1, 1909, ... 704
TOTAL DAILY CAPACITY TO JULY 1, 1909, ... 577,440,000 cu. ft.

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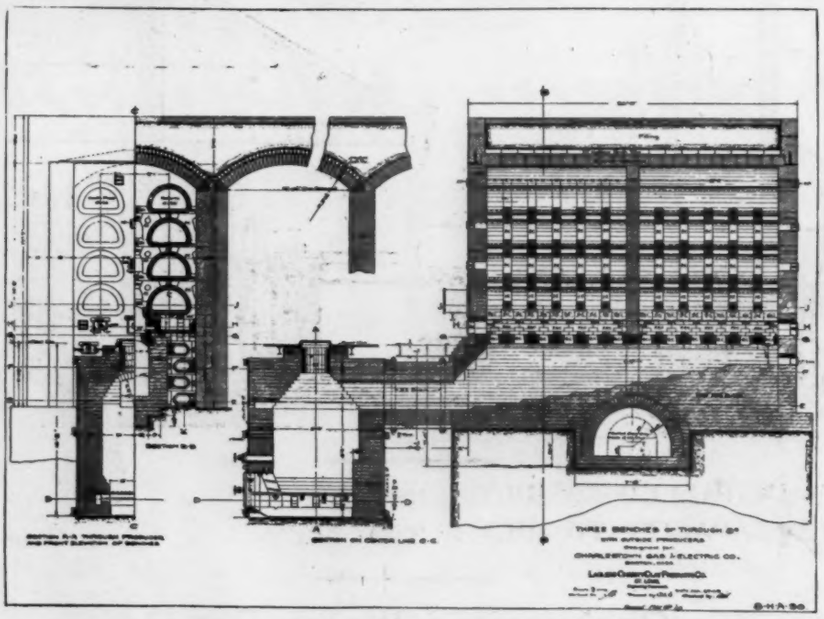

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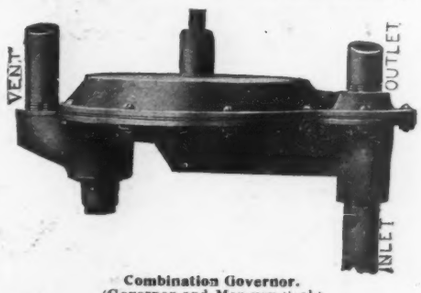

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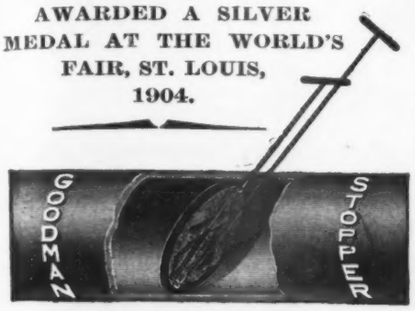

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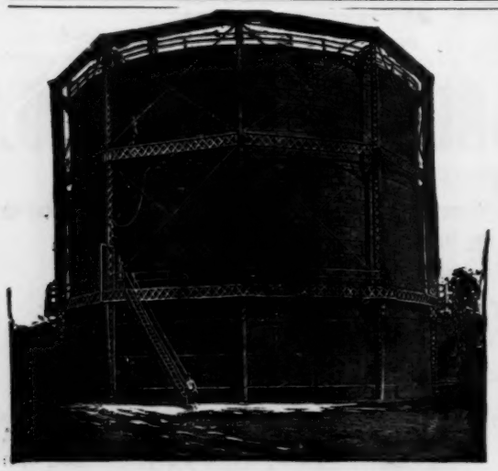

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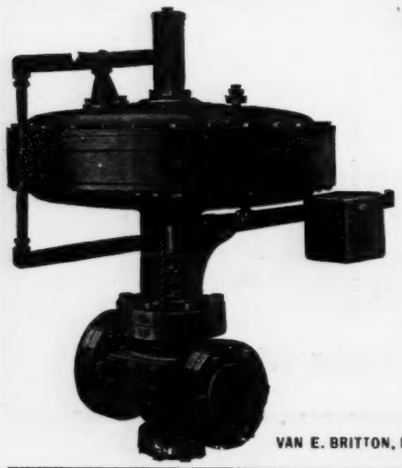

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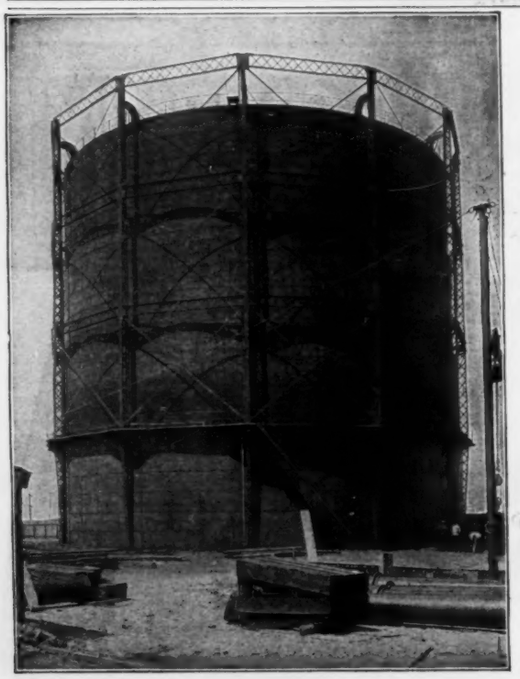

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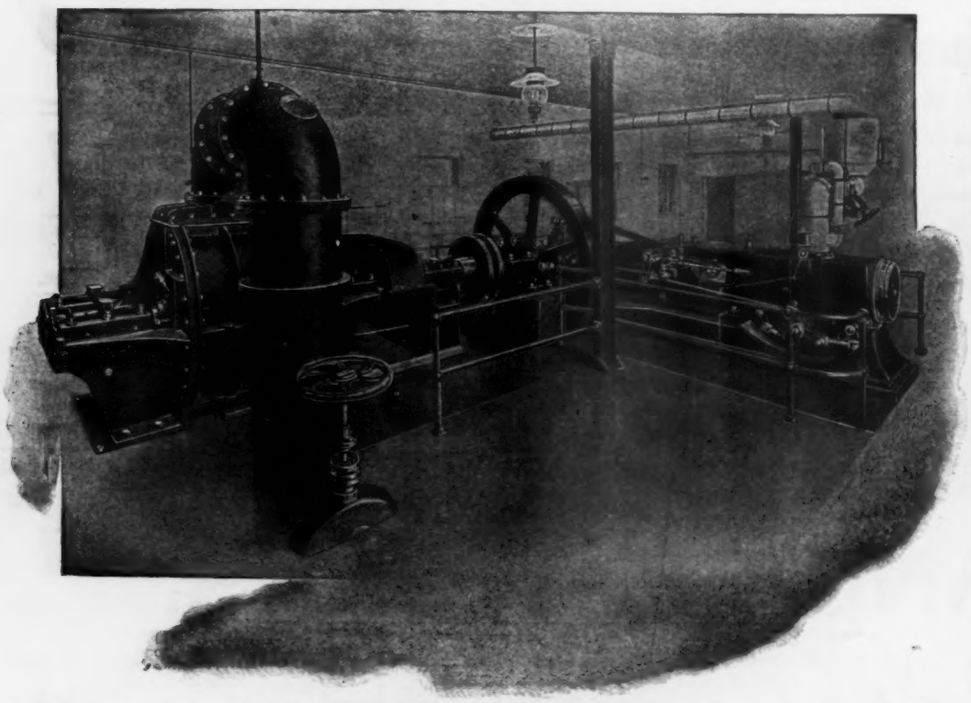

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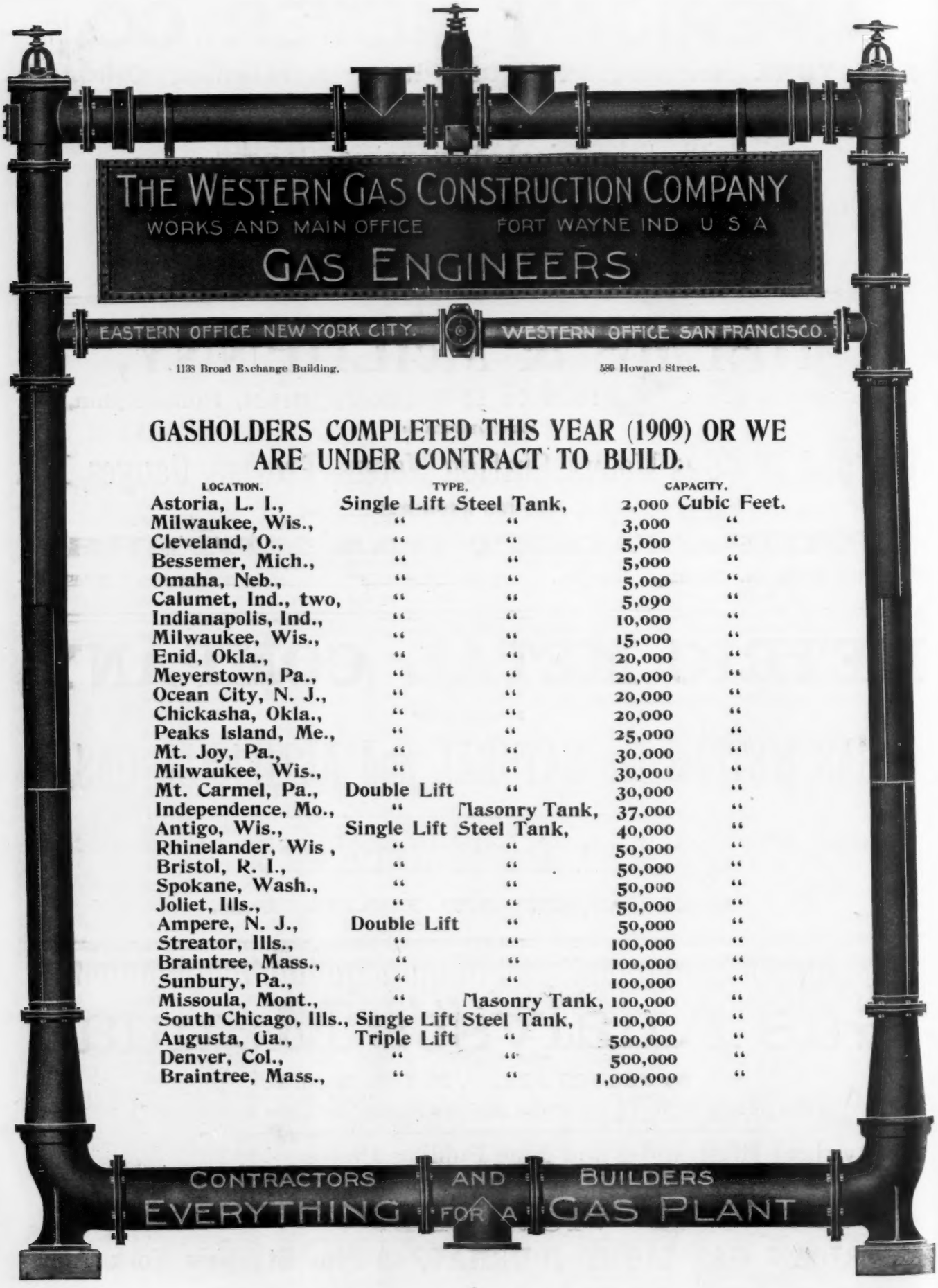
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Milwaukee, Wis.,	" "	3,000 "
Cleveland, O.,	" "	5,000 "
Bessemer, Mich.,	" "	5,000 "
Omaha, Neb.,	" "	5,000 "
Calumet, Ind., two,	" "	5,090 "
Indianapolis, Ind.,	" "	10,000 "
Milwaukee, Wis.,	" "	15,000 "
Enid, Okla.,	" "	20,000 "
Meyerstown, Pa.,	" "	20,000 "
Ocean City, N. J.,	" "	20,000 "
Chickasha, Okla.,	" "	20,000 "
Peaks Island, Me.,	" "	25,000 "
Mt. Joy, Pa.,	" "	30.000 "
Milwaukee, Wis.,	" "	30,000 "
Mt. Carmel, Pa.,	Double Lift "	30,000 "
Independence, Mo.,	" Masonry Tank,	37,000 "
Antigo, Wis.,	Single Lift Steel Tank,	40,000 "
Rhinelander, Wis ,	" "	50,000 "
Bristol, R. I.,	" "	50,000 "
Spokane, Wash.,	" "	50,000 "
Joliet, Ills.,	" "	50,000 "
Ampere, N. J.,	Double Lift "	50,000 "
Streator, Ills.,	" "	100,000 "
Braintree, Mass.,	" "	100,000 "
Sunbury, Pa.,	" "	100,000 "
Missoula, Mont.,	" Masonry Tank,	100,000 "
South Chicago, Ills.,	Single Lift Steel Tank,	100,000 "
Augusta, Ga.,	Triple Lift "	500,000 "
Denver, Col.,	" "	500,000 "
Braintree, Mass.,	" "	1,000,000 "